

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Thompson's Patent Pulverizer.

The machine shown in the accompanying illustration is intended to perform the operation of pulverizing upon all sorts of hard materials without the difficulties usually attendant upon that process, and at an unusually rapid rate. It is specially adapted to work upon ores, rocks of all kinds, rolling mill flx, &c., and reduce them to a coarse or impalpable powder, as may be desired. The principle used is that of employing a chilled-iron ball to roll over the material and thus reduce it to a powder. In the manufacture of amber, the cumbersome but effective method of grinding in past times derived its effectiveness from the use of heavy balls, but they were driven about in horizontal channels, and, we think, at a slow rate; the effectiveness of the principle was, however, beyond a question.

In the machine illustrated the balls are driven about in a vertical plane by elastic revolving disks, which are pressed against them, and at a high rate of speed. The balls themselves, in the largest size of the machine, weigh 100 pounds and roll upon a cast-iron ring or shoe, which is held upon a wooden cushion. The grinding is all done wet, and the journals of the machine are all carefully packed so as to prevent the entrance of grit into them.

The cut represents the machine with a portion of the front broken away so as to show the construction. The ball B does the work of pulverizing and rests upon the chilled iron shoe-ring C, and is driven by the rings or disks D D. In operation the ore or rock fed in by the buckets upon the endless belt M is carried upon the shoe ring and ground by the continuous action of the ball. The framing of the machine is divided through the center, as on the disks and ring, while the hopper and ends can be taken off so that there is no single piece that has any considerable weight even in the largest size of the machine, which weighs 5 tons. There are two smaller sizes, one of which weighs 3 tons and the other 1. We have not had an opportunity to see the machine in operation, but have heard it very highly spoken of. It is built for Mr. Stephen F. M. Tasker, by the well-known firm of Morris, Tasker & Co., Philadelphia. Mr. Tasker says the machine has been thoroughly tested and is capable of doing a very large amount of work. The figures he gives are 60 tons of rock passing a No. 60 screen in 24 hours. To accomplish this amount of work 10 horse power is needed. Such a machine takes up a space of 4 feet by 7. Experiments have shown that the machine is capable of grinding the hardest substances, and has been able to pulverize such articles as hammer heads and hardened steel bits thrown in to test its capacity.

## SCIENTIFIC AND TECHNICAL.

Mr. J. H. Thomson, of Shoeburyness, England, recently proposed a new method of working drilling machines. He recommends the use of

### DRILLING MACHINES OPERATED BY ELECTRICITY.

the drill being contained in a metal frame, in the central part of which are fitted two revolving drill spindles, one within the other, the larger being hollow and the smaller one solid. The small spindle has at its end a shoulder on which a drill or bit is fitted, and prevented from turning on the spindle by means of a feather and slot. Another drill or bit is similarly fitted on to a shoulder on the hollow spindle, and is made hollow to allow of the drill or bit on the small spindle revolving within it. The revolving spindles are driven in opposite directions, each having fixed to it a bevel-toothed wheel, which two wheels gear into and are operated by two bevel pinions, each fixed to a tubular part or sleeve made so as to revolve on a fixed axis at right angles to the revolving spindles, such axis passing from side to side of the frame, an aperture through the same being provided for the small drill spindle to work in. To each of the loose tubular parts or sleeves is fixed a disk, to which eight pairs of iron bars are connected. The said bars are wound with insulated wire so as to form electro-magnets. These in turn attract armatures fixed to the frame. The electric current is admitted through a terminal, whence it passes to a contact maker, thence to brushes, and from those latter to insulated rings, each split into eight parts to correspond to the magnet, and so arranged that only those magnets are in action which are approaching the armatures. From the magnets the electric current passes to another set of insulated rings, and thence by the brushes to a terminal. The connecting wires pass along the frame of the machine. Suitable handles are provided by which the operator may hold and work the machine. If the diameter of the small drill or bit be in the ratio of 794 (or thereabouts) to the diameter of the larger drill or bit, the two drills or bits will counteract each other, and the frame will not have a tendency to turn round. Single drills or bits may, however, be employed when (as in the case of small work) convenient.

Electricity has within late years produced wonderful results in almost all branches of science. One of the latest achievements, successfully introduced by M. Plante, is

### ENGRAVING ON GLASS BY MEANS OF ELECTRICITY.

the process being as follows: The glass is laid in a horizontal position, and covered

with a concentrated solution of nitrate of potash, the liquid being retained by a shallow vessel in which the glass is placed. A platinum wire is dipped in a horizontal position in the solution along the edges of the glass. The wire is attached to one of the poles of a secondary battery of 50 or 60 elements. The lines are traced by hand with the point of an insulated platinum wire connected with the other pole of the battery. The parts of the glass covered with the alkaline solution become engraved when touched with the end of the platinum wire, however rapidly this is moved, the thickness of the lines varying with the thickness of the wire. The current from either pole may be used in the writing wire.

Mr. William Crossley, of Glasgow, read a paper some time ago before the South Wales Institute of Engineers, on "Safety Lamps and Prevention of Explosions in Collieries." The danger of explosions is to be obviated by the introduction of

### A NEW SAFETY LAMP.

which should be worked with atmospheric air entirely extraneous to the colliery itself. This could readily be done by distributing air pipes through the works, exactly in the same manner in which gas pipes are distrib-

water level or movements of the vessel from which the apparatus was worked. The invention of Mr. Thomas English, of Hawley, England, relates to an

### APPARATUS FOR SUBAQUEOUS BORING.

the use of which, it is claimed, obviates all difficulties previously experienced. A rotating boring tube is employed, having at its end suitable cutters, which, when hard rock has to be bored, may be arranged as in diamond rock drills. This tube is steadied in a vertical or more or less inclined position by a frame resting on the bottom, the tube itself extending some distance above the surface of the water. At the upper end of the tube a bearing is provided for it in a framing, in which there is also a bearing for a short shaft at nearly right angles to the tube, carrying a bevel wheel which gears with a bevel wheel on the tube. The framing also carries a weight, the effect of which may be increased or diminished, as required for the nature of the work, by means of a counterweight connected to the frame of the drill tube by a rope or chain passing over pulleys on a jib or derrick mounted on a barge or other suitable floating vessel moored in the required position. On board this vessel is placed an engine, the revolving shaft of

were exploded by a lighted match, showing that they were the components of water. The experiment indicates that this explosive mixture of gases may be formed in a steam boiler, but it is scarcely probable they ever would be. The boiler must, at least in part, be raised to a full red heat. Then cold water must be injected, for so long as steam and the gases are mixed, the latter cannot explode. The injection of water must condense the steam in the boiler before it cools the red-hot iron. All these very probable conditions being fulfilled, an explosion of the gases may take place.

According to the *English Mechanic*, a patent has been taken out in Germany for a new description of

### ELASTIC LACQUER.

which will not peel off, and which is suitable for the coating of carriage-cloths, plans, and other articles to be rolled or folded, as well as for wood and ironwork, walls, &c. It may also be employed as an isolating layer for damp rooms, as a means against dry-rot, and in rendering stuffs water-proof. To produce the lacquer, 50 kg. of linseed-oil varnish are heated up to boiling point. In another vessel about 15 kg. of lime are slaked in 20 kg. of water. As soon as the

bath of bitumen or melted paraffine wax or other similar liquid, and an extra security of insulation and solidity is thus secured. It may be rolled or twisted up sideways to be placed in the bath. The web or ribbon, in the flat state as woven, can be easily painted with any fluid compound if desired, an ordinary paint brush being employed for the purpose, or the web or ribbon may be covered with gutta percha, or with some similar substance, by being passed through a die where the compound is under pressure.

### Steel for Ship Plates.

A decision recently announced by the Consett Iron Company, England, must be regarded as significant at the present time. This company has bought immense iron-works and collieries in the northwest of Durham at a very low price, and by good management it has paid wonderful dividends for many years. The company is, indeed, the largest iron-plate producing concern in the world; and hence it is a fact of very great significance to find that it has decided to erect a Siemens-Martin plant for the production of steel plates.

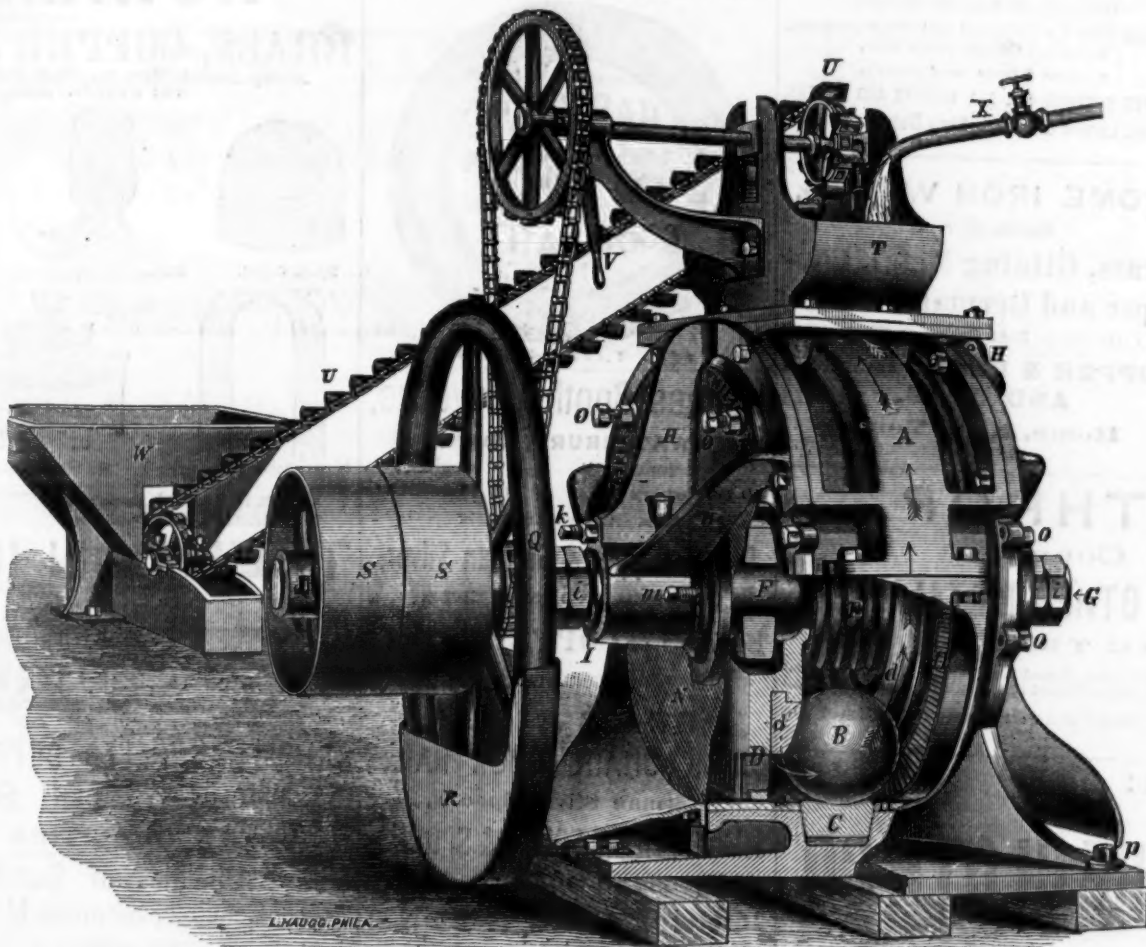
Hitherto the ships built on the northern rivers of England have, since the cessation of the building of wooden vessels, been of iron, with very few exceptions. Exceptional steel vessels have been built on the Tyne and the Tees and at West Hartlepool, but all the steel for some of these, and much of it for others, has been obtained from districts that have earlier commenced the production of steel plates for shipbuilding. Steel ship-plate production commenced on a large scale some three years ago only, but the immense steel-works erected near Middlesbrough produced 60,000 tons of steel rails in 1879, about 90,000 tons last year, and this year will enlarge that quantity. These were made at first exclusively from foreign iron ores, to the loss of the consumption of local ores, but the dephosphorization process enables the latter now to be used, and hence there is a growing production of steel, in the form of rails, in the North. Practically, the production of what was one of the staple manufactures of the district—iron rails—is now extinguished in place of those of the more enduring metal. For long there has been a controversy whether iron thus supplanted would also have steel substituted for it for shipbuilding uses.

The Consett Iron Company takes the lead in the production of iron for ships, and hence the significance of the step it has now announced, if even that step be taken on a scale comparatively small. Locally and nationally the question of the comparative service of iron and steel in shipbuilding is being discussed, and is also undergoing the test of experience. In the most recent of these discussions it was stated on the side of iron that a given vessel would cost 4½ per cent. more per ton of deadweight carrying capacity if of steel than it would if of iron; while, on the other hand, it was claimed that even with steel much above iron in price, as at present, it would, by carrying more, cost slightly less per ton of carrying capacity. An example was given of the cost of steel and iron vessels—the former of a certain size costing £18,350, and an iron one the same size costing £17,000, but carrying 80 tons less freight. Hence it was contended that for the additional cost there was a very large interest. When the matter is narrowed to these dimensions it can scarcely be said that it is too soon to speak of the ultimate substitution of steel for iron in shipbuilding.

### A Phosphor-Bronze Steam Yacht.

A trial trip of this small steam launch, the property of the Phosphor-Bronze Company, Limited, London, took place recently. The vessel is built entirely of phosphor-bronze. Her length is only 35 feet, her beam about 6 feet, and she attained a speed of 12½ miles per hour, which, considering her size, is a creditable performance. The chief object of the company in having so small a craft built was to test the rigidity of the phosphor-bronze sheet and angle pieces used in her construction, prior to having boats built on a large scale. The results have been beyond the company's expectation as regards rigidity and absence of vibration. As the cost of phosphor-bronze boats will not much exceed that of steel boats, and as the metal is not subject to corrosion like iron or steel, and also retains its value, the use of the material in the construction of steam launches, torpedo boats, &c., is probable.

The British army in South Africa, in the course of the war with the Basutos, found and destroyed some American plows. The fact is significant as showing how far-reaching is the American name and influence. The American thrasher breaks the quiet of the valleys of Palestine. The American mower and reaper perform their labor-saving operations among the vines and fig trees of Asia Minor. American agricultural implements carried off the prize last summer at a fair in Bulgaria, not far from where American rifles, in the hands of the Turks, carrying further than the old-fashioned weapons of the Russians, made such deadly havoc on the fields of Plevna. American locomotives thunder over the plains of Southern Russia, and through the gorges of the Caucasus to Tiflis, almost on the confines of Persia.



A—Body of machine.  
Aa—Steel wearing plates.  
B—Chilled iron ball.  
C—Shoe ring with wood cushion.  
D—Disk ring.  
Dd—Disk blades.  
E—Spring.  
F—Clutch journals.

G—Shaft.  
H—H—Braces for journal bearings.  
I—Nuts for setting disks.  
K—Set-screws for braces.  
M—Packing set-screws.  
N—Screens.  
O—Screws for holding screens.  
P—Foundation Bolts.

Q—Fly wheel.  
R—Fly wheel fender.  
S—Tight and loose pulley.  
T—Hopper.  
U—Automatic feed.  
V—Feed clutch.  
W—Ore receiver.  
X—Water supply pipe.

THOMPSON'S PATENT PULVERIZING MACHINE.

uted through the streets of towns and throughout houses. The pressure required would be about equal to that of gas in ordinary supply pipes, and the air could be supplied from a reservoir, which, in turn, could be kept full by means of suitable blowing appliances. The lamp is entirely closed to the outside atmosphere, except the outlets at the top for the escape of the products of combustion. It consists of an ordinary oil vessel and wick, a closed air reservoir for the distribution of air to the parts required for keeping up combustion and for cooling purposes, and, further, of two glass cylinders arranged concentrically, with a small air space between them. The air for combustion passes up through the inner glass cylinder. There is also a current of air between the outer and inner glass cylinders, which keeps the outer one cool, and, mixing with the products of combustion from the inner one, also cools them to a point at which they may be safely allowed to escape. Mr. Crossley's scheme also includes taking the lamps from the place where they are cleaned and prepared to the working parts of the colliery, which he proposes to effect by the aid of a tank bogie. This is so arranged as to contain atmospheric air at high pressure—say, 200 to 300 pounds per square inch, is fitted with small stop cocks, and is capable of carrying at least 100 lamps at a time for distribution in the working. The lamp can be arranged to burn in the same manner as an ordinary safety lamp during the time it is being carried from the place where it is prepared to the place where it is to be fixed for use.

Submarine boring has always been attended by considerable difficulties, resulting from the effects of tidal or other currents, changes of

which is connected with the shaft of the bevel wheel, which works the drill by a flexible twisted wire shaft, such as is frequently employed for working drills in various positions. A flexible hose in connection with a pump conducts water, under pressure, to the interior of the drill tube. The boring tube is lowered by means of the jib or derrick chain into guides provided in the steady frame, and its counterweight is adjusted to suit the nature of the ground or rock to be bored; it is then, by means of the flexible shaft and gearing, caused to revolve, while water is forced through it to scour out the borings, the tube descending as the hole becomes deepened. When it has descended a certain distance the gearing and its frame are detached, an additional length of tube is added, and the boring is continued.

### At a recent meeting of the American Academy of Sciences, an apparatus illustrating the

### DECOMPOSITION THEORY OF STEAM BOILER EXPLOSIONS

was shown at work, proving, according to the inventor, that steam might be decomposed by simple heat into the constituent gases of water—oxygen and hydrogen. The experiments conducted were interesting, but perhaps not conclusive as showing a possible cause of boiler explosions. The apparatus was very simple—a flask in which water was heated, a tube conveying the steam into a closed platinum crucible, where it was again heated by a spirit lamp, and a tube thence carrying the superheated steam and the liberated gases to an ordinary pneumatic trough, where the mixed gases were collected in a test tube, while the steam was absorbed. At the conclusion of the experiment, the gases thus collected

lime boils, about 50 kg. of hot melted raw caoutchouc are added to the lime water, and the whole is then stirred until it has become thoroughly mixed. This composition is poured into the boiling varnish, the whole being stirred all the time. Further stirring takes place until a homogeneous mass is formed, which is afterward strained or filtered, and left to cool. After cooling, the lacquer has a pap-like consistency. To apply the lacquer it is diluted with the desired quantity of varnish, and put on with brushes, either in a warm or cold state; but it is said to be better to apply it warm, as then no varnish is required for diluting it. In rendering linen water-proof, the lacquer may be put on by means of brushes or rollers. After treatment, the linen or other stuffs, paper, &c., are hung up to dry. Stuffs are perfectly dry and ready for use in two days. The product is stated to be lustrous, elastic, not sticky, and perfectly water-proof.

Prof. A. E. Ayrton has recently devised a novel method of COVERING WIRES FOR ELECTRICAL PURPOSES, the process being merely a modified form of weaving. The wire, which may be German silver, platinum, silver, &c., or simply copper or iron, if cheapness be desired, is wound bare on the shuttle and used as the weft, being woven backward and forward between parallel fibers of silk, cotton or any suitable material employed as the warp. The wires may, however, be arranged as the warp and the insulating material employed on the shuttle. The web, whether composed of a warp of wires and a weft of insulating material, or a warp of threads of insulating material and a weft of wire, may, if desired, be steeped in or passed through a



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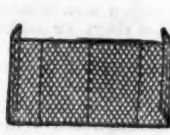
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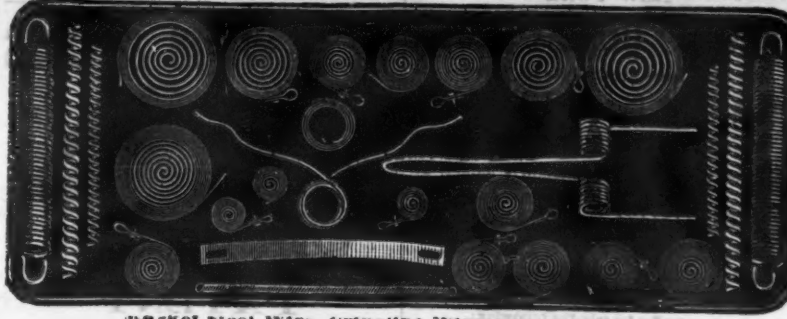
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**An Improvement in Annealing Furnaces.**  
William Nehring, of Cincinnati, Ohio, some time ago invented a new and useful improvement in annealing furnaces, the invention being more particularly designed for the production of malleable cast iron. It is well known that the labor of putting the articles to be annealed into, and getting them out of, the furnace by the customary plan is attended with much delay and difficulty, and that while within the furnace some of the larger articles are insufficiently annealed, while other articles, becoming overheated, are liable to sag and become welded together, and besides, injuries received from these causes are with difficulty removed from the furnace. With the object of economizing both material and labor and producing better work, Mr. Nehring has so constructed his improved furnace

parts. Rising vertically from the front edge of the truck floor is a wall, P, which, when the truck is driven home, serves as duty as its door. Ventilators or cooling inlets, Q, in the truck wall are closable by means of doors, R, by partially or wholly opening of which air may be admitted either to assist combustion or to aid in regulating the heat, either generally or locally, as may be deemed necessary. The doors, R, are preferably provided with mica windows, S, to enable inspection from time to time of the interior of the oven. T are the truck wheels, resting upon a track or tramway, U. V is an offset in the wall, B, to receive the luting bricks. The dimensions of the truck wall are preferably just sufficiently less than the interior of vault, A, to permit the introduction of luting bricks or tiles, W. X represents a cast-iron slab, upon which are stacked the crucibles or boxes, Y, which

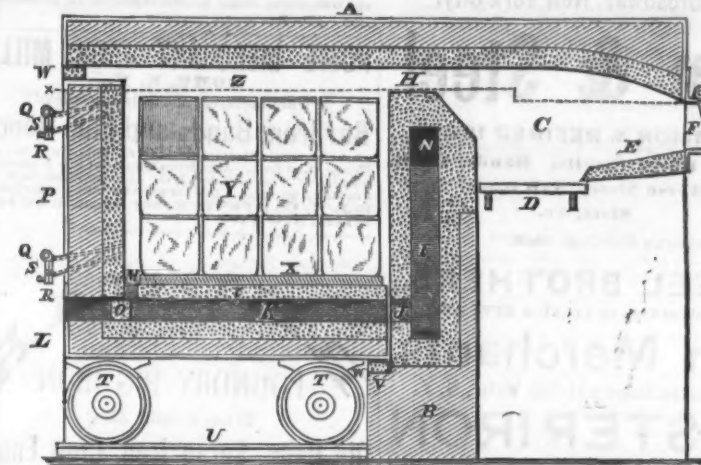


Fig. 1.—An Improvement in Annealing Furnaces.—Longitudinal Section.

that a full charge of articles to be annealed can be inserted simultaneously, and when, in the judgment of the furnaceman, sufficiently annealed, can be as promptly removed. To accomplish this, he has constructed the bottom and front of the oven or furnace on a strong iron framework, mounted on wheels, and movable toward and from the stationary portions along a rail track like a truck. Except for the largest articles, the objects to be annealed are placed in crucibles or boxes, which boxes are stacked on the floor of said movable portion, which portion is then pushed into the furnace proper, of which the floor of the truck then constitutes the bottom, and of which the wall at one end of the truck constitutes the closed door. This having been done, the joint between the fixed and movable portions is sufficiently closed by means of brick. In order to regulate and direct the heat to different parts of the furnace, the flues are constructed in several branches, one or more of which are capable of being wholly or partially closed at the discretion of the attendant. In the accompanying drawings Fig. 1 represents a longitudinal fore-and-aft section of an annealing furnace embodying Mr. Nehring's principle. Fig. 2 is a section on the line x x of Fig. 1.

are charged with the articles to be annealed. Having thus described the invention, the following is what Mr. Nehring claims as new therein: 1. The combination, in an annealing furnace, of the fire-place C, the partition wall, with its uptake I, and the truck L, with its wall P, and flues M and K. 2. The combination, with oven Z, whose floor and front are component parts, of a separable truck, L, the orifice Q and K in said front, and orifices M in said floor, communicating with oven, and with floor flues K, respectively, the said floor flues discharging into flues J, leading to uptakes I within fire-bridge B, said orifices being provided with regulating doors or stoppers, the whole being arranged and operated substantially as set forth.

The Queen City Malleable Iron Co., of Cincinnati, Ohio, have used these furnaces since last May, each furnace being filled with about 8000 pounds of castings three times per month, and up to the present time there has been no need of repairs. The company, in fact, feel confident that quite some time will pass before any repairing will be required. The surface of the grate and fire-place of the furnaces used by them measures 24 x 36 inches, and it takes 36 hours to produce temper heat. Their annealing boxes will stand from 6 to 12 heats. In future they expect to make the retorts as long as the trucks, and use in their construction 1/2

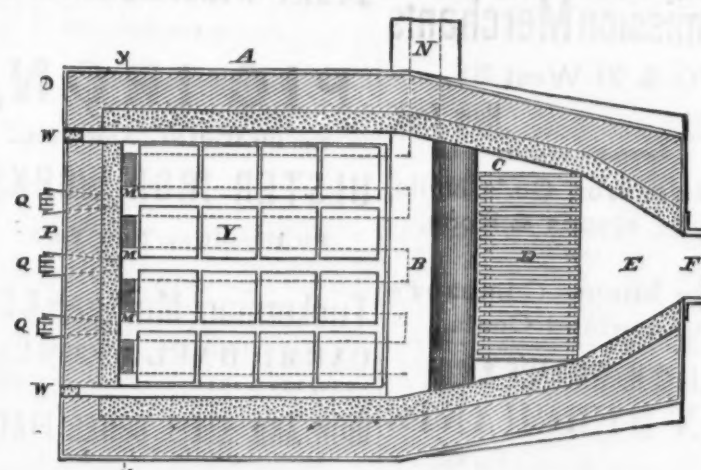


Fig. 2.—Section on the Line x x of Fig. 1.

may be packed with articles to be annealed, and can be pushed in while the other one is withdrawn. In unpacking the oven it is not necessary to destroy a who's wall of it, but only a few bricks must be taken out, and it is easy to see how much material, time and labor is saved.

The retorts are made of the same breadth as the trucks, and are lined inside with 1/2-inch cast-iron plates. A represents an arched vault of masonry, open at both ends. This vault is divided into two unequal compartments by a pier or parti-wall, B, which, stretching transversely from side to side, reaches nearly to the ceiling. Of these compartments the smaller compartment is, at its upper part, occupied by a fire-place or furnace proper, C, having a grate, D, coke shelf E, mouth F and door G. For this fire-place the upper part of wall B does duty as fire-bridge. Through the passage H, above the said fire-bridge, the products of combustion escape into the larger compartment afore-said. The wall B has a flue or uptake, I, which communicates at or near its lower part on the front side with a series of flues, J, communicating with like flues, K, in the bed or floor, I, of the truck L. The uptake I discharges by flue N into a suitable chimney. The flues K, near their front ends, communicate by short downtakes, M, with the said larger compartment, which, in conjunction with the truck, constitute the oven proper, Z. The flues K extend preferably to the extreme front of the truck, so as to form openings, K, in the manner represented, and each is supplied with a movable plug or stopper, O, which, being pushed rearward or drawn forward, serves to close or open the respective downtakes, and thus to regulate and direct the heat to particular

inch cast-iron plates, expecting as a result increased facility in packing and unpacking the castings. The retorts will stand at least 15 heats. Furnaces for burning earthenware, cementing steel, &c., may be constructed similar to the one here described.

**The Austrian Iron Trade.**—A rising tendency has made itself felt in the Austrian iron market, and the improvement which has taken place during the past few weeks has not been confined to particular descriptions of iron, but has been almost universal. Pig iron, especially, occupies now a very firm position, and is worth a great deal more than a month ago, although sales have not been of very formidable extent; because makers, speculating upon a brisk business in the spring, keep very reserved, especially with regard to future delivery. Styria and Carinthian pig can only with difficulty be obtained under 43 florins per ton, and as refining forges and manufacturing are provided with orders which will in most cases extend as far as the middle of next year, and inquiry is still good, the continuation of the present firm tendency of the market may be implicitly relied upon. Steel rail mills and steel works generally are still in full swing with old orders, and engineering shops are likewise well provided with work. It is a fact that, notwithstanding the advanced state of the season, business is conducted on a very firm basis, that a stop has at last been put to precipitate offers, and that fluctuations, caused by severe competition, have ceased. The proposed increase in the import duties on pig iron, however, has also not slightly contributed to strengthen the market. But



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the opposition on the part of consumers of pig iron against such an increase is becoming more and more determined, and a petition against it has been sent to the Minister of Commerce by the Austrian iron works, demonstrating how an increased duty on pig iron would seriously and permanently injure that branch of industry, by abnormally raising the price of raw material. An advance of prices for red iron by the Bohemian works has only been partially adopted in the Moravian and Silesian works. A recent report states that a new coal seam has been discovered between Miroesch and Rosenthal, in the Pilsen district. The present state of affairs is of an encouraging character, and the prospect of business in spring is promising in every respect.

**Account Books as Evidence.**—When books of account are to be used in evidence to prove a debt, it is sufficient to make the entries therein admissible to show that they were made in the regular course of business. An action was brought for the price of 25 barrels of flour. The charges upon the books were made by the bookkeeper upon the information of the salesman who had sold and delivered the flour to the defendant, Law. The defense was that the book entries were not made upon the knowledge of the bookkeeper. The court said: "We discover nothing in this case to take it out of the well-settled rule that the books of the parties containing daily accounts of their business transactions, and made in the regular course of business, are admissible in evidence in their favor in an action for the goods sold and delivered. The charges on the books of a tradesman are often necessarily made by a bookkeeper upon information given by the salesman who actually sells and delivers the goods. Such charges are made in the regular course of business. It is difficult to see upon what principle they could be excluded."—Smith vs. Law, Supreme Court of Connecticut.

**Reclaiming Goods Before Delivery.**—The right to stop goods in transit because of any failure to comply with the contract is ended when the goods reach their destination and are stored by the carrier as the agent of the purchaser. The Mason & Hamlin Organ Company sold at Chicago to one Peck, of Waverly, Iowa, two organs, upon time, and shipped them by the Illinois Central Railroad late in December, 1879. The organs were unloaded at Waverly and stored in the warehouse for Peck, and, about the 1st of January, Peck was compelled to suspend business because of insolvency. One Clapp, a creditor, attached the organs, and the organ company intervened in the action to reclaim the property, and recovered judgment. On appeal it was held that an unpaid vendor has the right to reclaim goods while in transit, and the right continues until there is an actual or constructive delivery of the possession to the purchaser. If upon the arrival of the goods at their destination they are stored in a warehouse by the carrier, as the agent of the consignee, the vendor's right of stoppage is terminated.—Clapp vs. Peck, Supreme Court of Iowa.

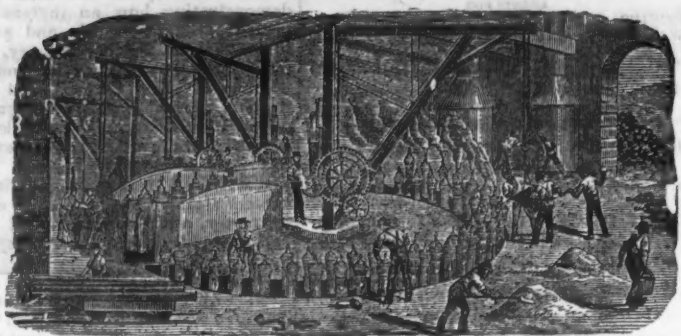
Seaworthy torpedo boats will probably change the naval armaments of the world in a remarkable way. Information has been received that the two improved first-class torpedo boats which Messrs. Yarrow & Co., England, lately built for the Argentine Government have reached Buenos Ayres in perfect safety. The vessels were rigged for sailing, and have been found to answer very well under canvas. One was navigated direct from London across the Atlantic without being accompanied by any convoy, while the other steamed first to Fiume to have her torpedo gear fitted on board at Mr. Whitehead's works. This is the first instance in which a torpedo boat has crossed the Atlantic, the result being that craft of the kind can be built combining exceptional speed and rapidity of movement with seaworthiness and capability of steaming long distances. The two Austrian boats completed by the same firm, which, it may be remembered, realized a speed of 22 knots, have successfully steamed from Pola to Pola. Messrs. Yarrow have also despatched ten of the same class of torpedo boats, known as the Batoum class, to the Mediterranean, thereby proving that they can be navigated long distances in case of need. The firm are at present engaged in building similar boats for the Dutch, Italian, Portuguese, Argentine and Brazilian governments.

Commenting upon the future prospects of Spanish ore, *La Gaceta Industrial* refers with satisfaction to the amount of foreign capital which is finding its way to Spain, and being invested in the erection of steel works. Already there are a number of natives engaged in this particular trade; but the time seems approaching when many of the large European steel producers will find it necessary to turn out the finished material on the spot where they obtain the ore. Among the firms mentioned as already constructing works, or in negotiation for the necessary property in the North of Spain, are Krupp & Co., several Belgian firms, and a well-known English house, Bilbao will have several steel works under foreign management; there will be one at Santander, and another at Belmez; while in the province of Oviedo rumors are prevalent of the establishment of a large plant for working the basic process.

The excellent work of aiding in extending American commerce by means of information in relation to foreign markets gathered by our Consuls and laid before the public by the State Department, is constantly producing valuable results. A document of 383 pages just issued from the Government Printing Office gives an amount of well-digested information in relation to the cotton goods trade of the world, and the share of the United States in it, which is nowhere else available. Although 23 of the 79 Consuls requested to respond to the circulars of the State Department failed to do so, the answers received cover all the important countries and commercial centers of the globe.



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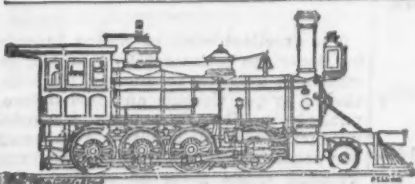
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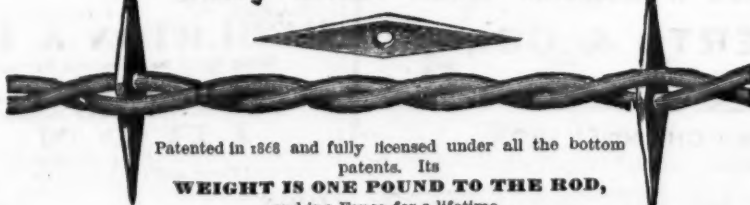
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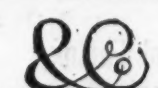
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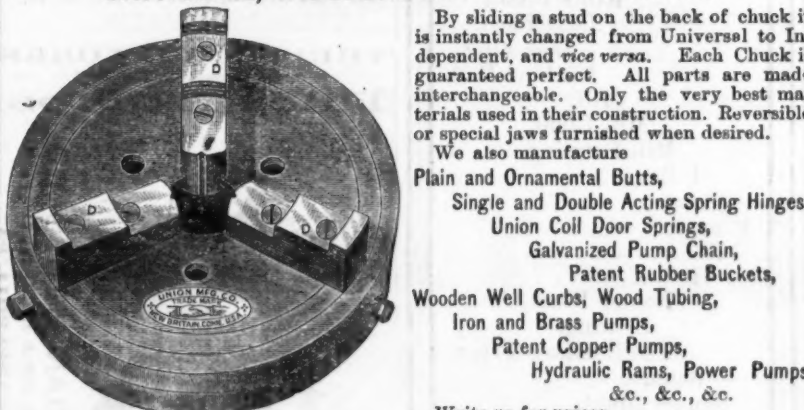
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There are few mechanics or artisans in any branch of business who do not find it necessary to use ropes for various purposes. In a great many places human life depends upon the care and skill with which they are handled. Many subscribers have from time to time asked questions in regard to splicing, knotting and taking care of ropes, and we



Fig. 1.—The Twisting of a Right Handed Rope.

have determined to combine in one article the information which at first we intended to put into a series of answers to queries. We shall at the same time add such matter as seems to be necessary and important in this connection.

Ropes are divided into several classes, according to the method in which they are made or twisted. In general, the yarn from which the strands of a rope are spun is twisted from the right over to the left, thus



Fig. 2.—A "Shroud" Laid Rope. Four Strands, with a Core or Heart.

making the yarn itself right-handed, as it is called. The strands which are formed from the yarns are twisted in the opposite direction, so as to be left-handed, while those in turn are twisted together so as to make the rope right-handed. This we have attempted to illustrate in Fig. 1. Such a rope as this is called by sailors "plain-laid" rope. Sometimes, even in small ropes, four strands instead of three are used, and the



Fig. 3.—A Cable or Hawser Laid Rope.

rope is called "four-stranded." Such rope in the small sizes is somewhat smoother outside than plain-laid rope. When it is larger it is made with a core or heart, as is shown in Fig. 2, and is by sailors called "shroud-laid."

These ropes are often laid up into a larger left-handed rope. This makes what is called a cable-laid or hawser-laid rope. This is



Fig. 4.—One way of Securing the Ends of a Rope by Whipping or Serving.

shown in Fig. 3. In England, "hawser-laid" is applied to ropes laid in the manner shown in Fig. 2, and "cable-laid" to a left-handed rope made up of three hawser-laid ropes like that shown in Fig. 3. This is probably the correct way of naming them. There are many other kinds of rope, some of which, like the bell cords of cars, are made by braiding. These latter are very strong, but are not usually made in large sizes. They are not easily spliced, and, so far as we know, are only joined by knots or metallic couplings. Probably they could be spliced, but we do not know how it would be undertaken. It is well to note that right-handed ropes coil "with the sun," and left-handed ropes in the opposite direction or "against the sun."

When we make use of cordage of any kind



Fig. 5.—Manner of Laying the Twine in Commencing to Whip or Serve the End of a Rope.

of course the ends require protection, to prevent them from untwisting and becoming frayed and unserviceable. To secure the end of a rope properly, then, is the first thing that demands attention. The most natural fashion of doing this is to simply tie an overhand knot and jam it fast. This may prove effectual, though the untwisting of the ends beyond the knot and



Fig. 6.—Passing the Free End of the Twine Through the Loop.

the liability of the knot to slip when first made, render it somewhat unsafe. Usually, too, a knot of this kind in the end of a rope is inconvenient. If intended to prevent the rope from going through a hole, it has the additional disadvantage of not forming a square shoulder.

The simplest method of making the end of a rope secure is by whipping or "serving," as sailors sometimes call it, with twine or



Fig. 7.—The Loop Pulled Down Beneath the Turns.

waxed thread, according to the size of the rope. This, if well done, is a serviceable method. One method which is pretty generally known is shown in Fig. 4. The end of a rope when whipped has this advantage—that the end will pass through any opening which will admit the rope itself.



Fig. 8.—Manner of Securing the End of the Twine when the Winding is Finished.

There are several methods of whipping, some of which, under the name of "lashings," are useful for other purposes. In Fig. 5, we show how the twine is to be laid in commencing to whip or "serve" the end of a rope. One end forms a loop along the rope; the twine is then carefully wrapped around and drawn "tau." When the whole space has been covered, the free end of the twine is passed through the loop

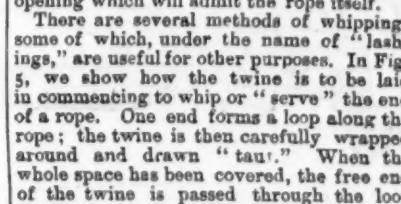


Fig. 9.—Another Method of Whipping or Serving the End of a Rope.

as shown in Fig. 6. Then, by pulling on the end, the "bights" or loops are pulled down beneath the turns, as shown in Fig. 7. The loop, of course, is under all the turns. In Figs. 8 and 9 another method is shown. The twine is laid along the rope and the winding begun at once. When completed to within half a dozen turns of the end, a piece of twine is looped and laid down on the rope and the turns taken over it. When the winding is finished the end is passed through the loop, and then, by pulling, the end is drawn through so as to appear as in Fig. 9.

Fig. 10 shows how the ends of very large ropes are sometimes finished. Here not only are the large strands wound or served, but the rope itself is secured in the same manner. Finally, the strands are turned over and whipped down upon the main or "standing" portion of the rope.

In Fig. 11 we give a sketch of a whipping which is useful when a rope has a great deal



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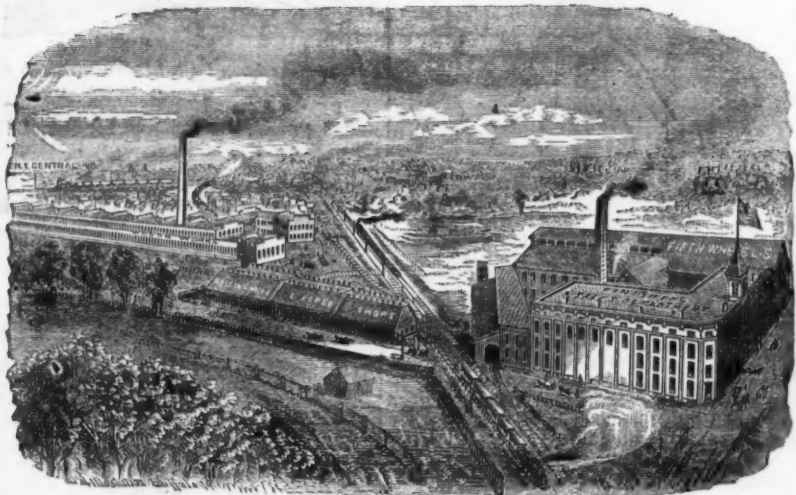
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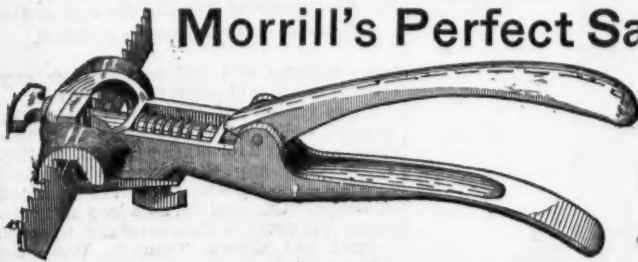
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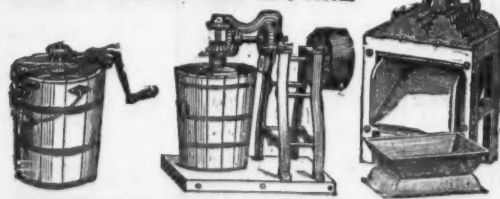
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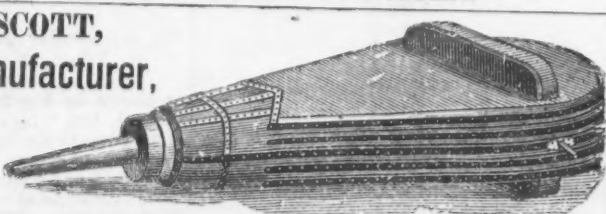
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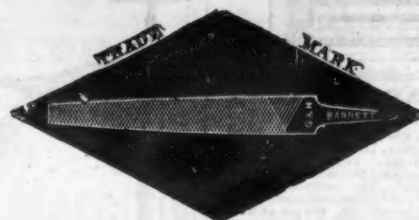
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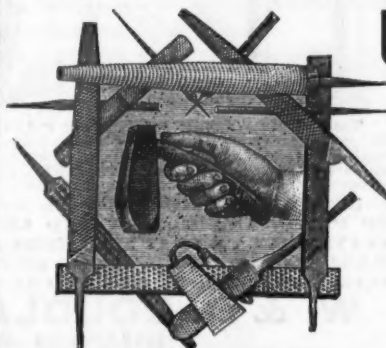
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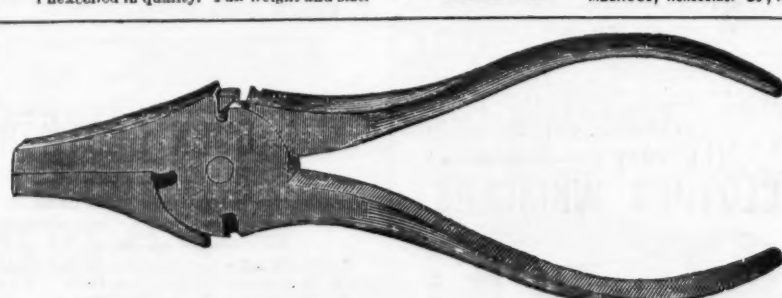
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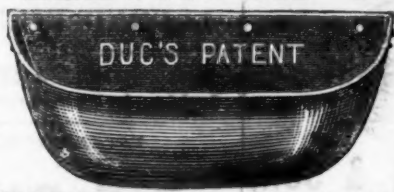
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of hard usage, like that of a fall and tackle, and in ordinary whipping is likely to come off. The whipping is made in any of the ways we have shown, and then the ends are passed around the whipping between the strands. To do this in the most convenient manner, an extra loop like that shown at a



Fig. 10.—A Method of Finishing the Ends of very Large Ropes.

in Fig. 6 should be used to take one of the ends down the center after coming upon the outside. This method, by forcing the turns of the twine down into the space between the strands, makes a much more secure piece of work than can be made in any other way. Men who make a business of moving safes in cities have to coil and uncoil their ropes and rig them through blocks oftener

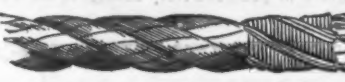


Fig. 11.—A Whipping very Useful Upon Ropes having much Hard Usage.

even than sailors. To protect the ends of their most important ropes they not only use the whipping, which we illustrate, at the ends, but put on another just like this about 6 or 8 inches from the end of the rope. A whipping of this kind is best put on with a sail maker's or bagging needle.

(To be Continued.)

## The Huntington Emery Wheel Dresser.

We show in the accompanying illustration an improved form of emery wheel dresser for sharpening, truing and shaping emery wheels, and also for removing the glaze from them. The tool consists of a cast-iron handle some 12 inches long, carrying at one end a series of independent sharp-toothed, hardened steel cutters, which turn freely upon a steel pin. These cutters are four or five in number, and have thin disks of steel between them for the purpose of protecting the points. The tool has two sets of cutters, one of which has disks, and the other is plain. A sample of the tool was sent us, and, being rather skeptical in regard to its utility, we at once proceeded to a shop to have a trial made. The first work was done upon an old and badly eccentric grindstone, which we suppose was rather an unfair test. The stone could be trued up with the tool, but only a small portion was done, as the surface did not seem to be quite satisfactory, and a piece of ordinary gas pipe could be employed more effectively. The workmen predicted a failure on the emery wheel also, and said that the diamond tool would be much more effective. Upon trial, however, on a badly glazed wheel we were much surprised to find that it produced in a few minutes a sharp and very nice cutting surface, did not chip the edge of the wheel, and, in fact, appeared to be very satisfactory for the purpose. The wheel was a very small one, and of fine grit. We had no opportunity for testing the value of the tool for shaping, but as it did not injure the edge of the wheel, we see no reason why it should not



HUNTINGTON EMERY WHEEL DRESSER.

be available for shaping of all kinds. For sharpening a wheel it is satisfactory, as the surface left by it is all that could be desired. The manufacturers say that the tool should be kept well oiled while in use. This is, we presume, in order to secure a free revolution of the cutters, so that the teeth may not strike in the same places each revolution. To further secure this, the tool should not be kept on the stone continuously, but raised a little from time to time. In the different cutters the teeth are of different pitches, so that if one set of teeth are in line across the wheel, all the others will "break joint" or be "staggered." The tool is made by the Chicago Screw Company, corner of West Washington and Desplaines streets, Chicago, Ill., who own the patents for the recent improvements in the tool. After some severe work upon an ordinary grindstone and the facing of an emery wheel, we examined the points of the teeth under a magnifying glass to see if any wear had taken place. To the naked eye none was perceptible, and even under the glass it was difficult to say that there had been anything more than a roughening of the teeth. The tool is sold at less than one-third the price of a good diamond tool.

The United States Underground Cable Company has just been organized under the general laws of the State of New York, with a capital of \$600,000, which is divided into 6000 shares, with a par value of \$100 a share. The following gentlemen are the trustees and incorporators of the company: Adolpho Hegewisch, Joseph J. Slocum, John K. Creevey, Alfred Reichelt and Harry A. Samuels. Adolpho Hegewisch is president, Joseph J. Slocum treasurer, and John K. Creevey secretary. This company has contracted with the Societe Anonyme des Cables Electriques, of Paris, France, for the purchase of the Berthoud-Borel patents for the United States, and propose to manufacture and lay underground electric cables, both for telegraphic purposes and lighting and for telephonic purposes. The Societe Anonyme des Cables Electriques will manufacture and ship full and complete sets of machinery for the purpose of putting into practical operation the Berthoud-Borel system in the United States, and will send skilled machinists to explain and superintend the working of the same.

## INDUSTRIAL ITEMS.

## MAINE.

The scythe and ax shops of the Hubbard & Blake Mfg. Co. at West Waterville were burned last week; loss on buildings and machinery, \$15,000, and on stock \$10,000; insured for \$16,000.

The Novelty Plow Company has been organized at Portland, with a capital of \$150,000. The United States Bullion Company is also a recent organization at that place, to carry on the business of milling, smelting, &c. Capital, \$500,000.

## MASSACHUSETTS.

Great activity prevails in the works of the Gold Medal Sewing Machine Company, who are shipping more machines this month than ever before at this season of the year. The pay roll shows the full number of men employed.

The Phoenix Manufacturing Company, Taunton, are running nights to fill orders. The Farist Steel Company, of Bridgeport, Conn., got all their crucibles from the Phoenix Company, as do also the Collins Company, of Collinsville, Conn.

William Fox, of Ohio, has leased the idle Cape Cod Glass Company's works at Sandwich, and will start the glass business again.

The Washburn Iron Company, at Worcester, have contracted to deliver 2300 tons steel rails to the New London Northern Road between next March and June.

The Mason Machine Works, of Taunton, have furnished the machinery for the new mill at New Bedford. It is said this concern and the Taunton Locomotive Works have orders ahead for two years to come.

The Barney & Berry Skate Factory, Springfield, is driven with work, and yet the concern is a long way behind its orders. The 125 men and boys employed will turn out some 300,000 parts of skates this year. When the establishment was started, ten years ago, there were but thirteen men, and they made 2000 pairs the first year.

Every day brings out some new marine scheme, and the latest is set forth by A. P. Bliven, the projector, as a proposition to build steamers of a new model and frame, with dome-shaped deck and absolutely no masts and spars. He says a company has been formed to undertake the building and operation of steamships of this kind, including Gen. Butler, Alexander H. Rice, John W. Candler and other Boston and New York men. The vessels will be built at Nyack, on the Hudson, and will cost about \$600,000 each. Great improvements in the application of motive power are also claimed to be in the possession of the projectors, and increased safety and other advantages are anticipated from the whole plan. If these schemes of Bliven and Lorillard for American steamships meet half the anticipations of their authors, American commerce will soon revive by the simple act of reviving.—Springfield Republican.

The water shops at the Springfield Armory are now running at their full capacity, turning out 100 gun barrels a day. The pieces of metal to be turned into barrels arrive from the Pennsylvania mills in short, thick cylindrical bars. A hole is bored through the center of each, and after various processes the red-hot iron is put through a machine having a series of gradually narrowing grooves. The barrel is slowly diminished in size, and thereby lengthened, in passing through these grooves, till it gains the required size. It is then, while hot, pressed into shape. It is polished, straightened and the necessary threads and sights put on, and then rifled by a very ingenious machine.

The locks are finished at the armory proper, where the stocks are made and the parts put together to form the gun. Besides the forging of barrels, the ramrods and bayonets are produced and finished at the shops.

## RHODE ISLAND.

A few years ago a company was formed at Woonsocket under the firm name of the Narragansett Horse Nail Company. The works were continued about two years and then suspended the same length of time. Nearly three years ago the works were revived, and William S. Phillips, of the Globe Horse Nail Company, of Boston, was appointed superintendent, and the company now exists as the Woonsocket Horse Nail Company, with Lyman A. Cook, president, and F. A. Perkins, treasurer. A large amount of money has been expended in the preparation of adequate machines for the business, and the present company claims to have perfected machines which are covered by patents. One of them makes the "blanks," and is termed a blanking machine, while the other rolls, clips and points the nails, two at a single stroke of the machine. These machines are capable of making 250 pounds of nails per day. The best Norway iron, rolled expressly for this company by the Norway Iron Works, of Boston, is used, from 1 1/2 to 2 tons of nails being manufactured weekly. There is some talk of removing the works to Boston.—Boston Commercial Bulletin.

## CONNECTICUT.

The Hartford Engineering Company, Hartford, have a double force of men at work. Among the several large engines in the works are two 20-inch engines for the Wareham Nail Company, of Wareham, Mass., and the Globe Yarn Mill, of Fall River. Two 20-inch engines have just been shipped to the Globe Mills at Saco, Me.

The Bridgeport Brass Company expects to be in active occupation of its large extension about Jan. 1. Business is booming and seems to promise well for the future.

The Vulcan Iron Works at New Britain are pressed with business, and are engaged upon enlargement of capacity to enable them to meet their orders promptly.

The American Pin Company, of Waterbury, are doing about as much business as they have capacity for, although competition in the manufacture of pins is very active. This company is doing its present



## Cutlery.

## FRIEDMANN &amp; LAUTERJUNG,

Manufacturers of  
PEN AND POCKET CUTLERY,  
Solid Steel Scissors, Shears, Razors, &c.  
Sole proprietors of the renowned full concave  
"ELECTRIC RAZORS,"  
And the celebrated "ELECTRIC SHEARS," Nickel Plated  
Bows.  
Agents for the BENGALL RAZORS.  
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.  
91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

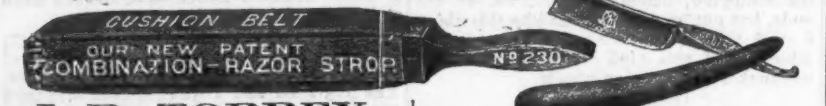
## LAMSON &amp; GOODNOW MFG. CO.,

Salesroom and Warehouse, Factories,  
38 Chambers Street, New York City. Shelburne Falls, Mass.  
Superior Cutlery of all kinds and grades, from the finest in pearl and ivory handles to the lowest  
price in wood and iron handles.

OUR  
BUTCHERS' and HUNTERS' KNIVES  
Are warranted to be equal in style, finish and quality, to any goods made in the world.  
"COMPARE, THEN JUDGE."

We are the sole owners of the Gardner Patent Guard and Rest for Carving Forks, and  
the manufacture of fine carvers is with us a specialty.

## AMERICAN MADE RAZORS



J. R. TORREY,  
MANUFACTURER OF  
STROPS  
In all Styles.  
J. R. TORREY RAZOR CO.,  
MANUFACTURERS OF  
RAZORS.

To introduce we offer HOLLOW GROUND RAZORS at \$1.50, \$1.75, \$2; Ivory, \$2.50. Our SWED-  
ISH GEM RAZORS, \$1.75, \$2, \$2.50; Ivory, \$2.50. All our own make, and warranted the best cutters in  
the world. As razor makers we know what is needed to sharpen a dull razor, and will mail for 75 cts. a  
strop warranted to set a fine edge to any razor. If in morocco case, \$1.  
Factories at WORCESTER, MASS. Catalogues to the trade.

## JOHN WILSON'S CELEBRATED

TRADE MARK.  
"FOUR PEPPERCORNS AND A DIAMOND."  
GRANTED A D 1766 BY THE  
CORPORATION OF CUTLERS OF SHEFFIELD  
AND PROTECTED BY ACT OF PARLIAMENT.  
REGISTERED ALSO AT  
WASHINGTON U.S.A. ACCORDING TO ACT OF  
CONGRESS  
ALSO AT LEIPZIG, IN  
ACCORDANCE WITH THE GERMAN TRADE  
MARKS' REGISTRATION ACT.

It having come to the knowledge of  
JOHN WILSON that Counterfeit Butchers'  
Knives, purporting to be of his manufacture,  
are being sold in the United States, he hereby  
cautions all purchasers of his Knives and  
Steels to be on the alert against such im-  
position.  
JOHN WILSON also hereby gives Notice,  
that it is his determination to institute Legal  
Proceedings against any person or persons who  
may be detected infringing his Trade Mark.  
Every article of JOHN WILSON'S manu-  
facture, bears the Trade Mark, in addition to  
the Name.

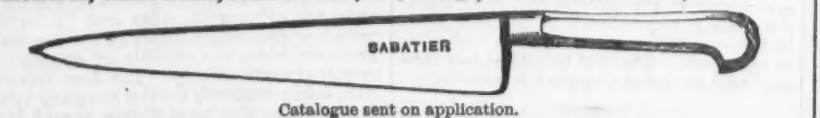
WORKS—SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

Manufactured of imported English Cast Steel.  
Every Pair Warranted.  
For samples and prices address,  
GIFFORD MANUFACTURING CO.,  
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## J. SABATIER &amp; CO.,

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Manufacturers and Agents,  
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Cafetieres, Chair Nails, Steel Chains, Key Rings, Luminous Articles, &c.



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## THE SHRODER DOOR SPRING.

The BEST DOOR SPRING in the MARKET.  
It will hold a door open as well as shut, and by its peculiar form has  
four inches more leverage to hold a door shut, closing it tight, where  
all other Springs fail. No latch required with this Spring.  
DELONG & SHRODER, Manufacturers,  
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Correspondence solicited with jobbers and large dealers. We will  
send a full-size Spring or a small model free, on application. Try it.

## REMOVAL.

Please notice that we have removed from No. 295 THIRD AVENUE to  
No. 37 Warren Street, near Church St.,  
Where we hope to be favored with a continuance of your generous patronage.  
J. M. FARRINGTON & CO.,  
Successors to DAY, FARRINGTON & CO., Manufacturers of  
LOCKS, KNOBS, GONGS, BLANK KEYS,  
Wrought Store Door and Flush Bolts, Silver Plated, Ornamental Bronze and other Hardware.

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## CORPORATE MARK,

Joseph Rodgers & Sons'  
(LIMITED)  
CELEBRATED CUTLERY,  
No. 82 Chambers Street, New York.  
F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons'  
productions having considerably increased, they  
have, in order to meet it, greatly extended their  
Manufacturing Premises and Steam power.  
To distinguish Articles of Joseph Rodgers  
& Sons' Manufacture, please to see that they bear  
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ESTABLISHED 1836.  
Alfred Field & Co.,  
COMMISSION MERCHANTS,  
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## Guns and Pocket Cutlery.

SPECIALTIES.  
Headquarters for  
ELEY'S BROS.' GOODS, WRIGHT'S ANVILS  
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FIELD, FRASER & CONTINENTAL POCKET KNIVES,  
BUTCHER'S FILES, TOOLS AND RAZORS,  
JOSEPH ELLIOTT'S CELEBRATED RAZORS,  
WESTERN FILE CO.'S FILES,  
ENGLISH AND GERMAN GUNS,  
ROBERT SORBY & SONS' SHEEP SHEARS,  
STURTS' FILES, WESTERN FILES,  
GREAVES' SHEEP SHEARS,  
CHESTERMAN'S TAPES,  
GERMAN COIL AND HALTER CHAINS,  
BRADES' TROWELS AND HOES,  
CANASTOTA KNIFE CO.'S POCKET KNIVES,  
Etc. Etc. Etc.  
All sorts of Hardware and Merchandise for im-  
port and export purchased on commission.  
Silver Medal, 1878—Paris.



## JOHN SPENCER &amp; SON,

Albion Steel Works, Sheffield,  
MANUFACTURERS OF  
FILES  
AND  
STEEL,  
Table Knives, Razors, Shovels, &c., &c.,  
of every description.

## CORPORATE MARK.

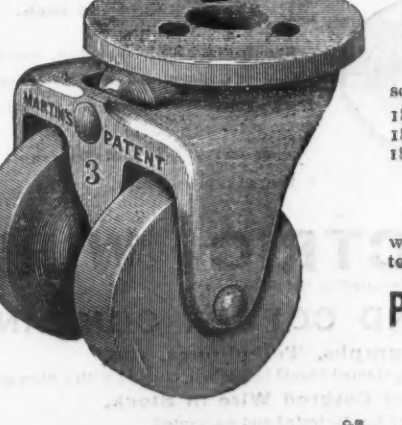
SPENCER  
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Granted 1749.

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PRICES FURNISHED ON APPLICATION.

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Indianapolis, Ind.



Hibbard, Spencer & Co., Chicago, have  
sold our Casters as follows:  
1879.....\$322.60  
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We have just issued a new Catalogue,  
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Our Drawers are so uniform, simple  
strong and effective that it has made  
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Recommended as  
the best Hand Clip  
per made.  
Extra pieces for  
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Send for circular.

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The best  
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CORPORATE MARK  
Every  
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Guaranteed.

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Send for price list and terms.

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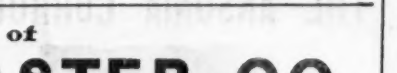
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1 Platt St., New York, Proprietor of the  
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Maynard's C. S. Planters'  
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variety of other kinds for  
Home and Export Trade.



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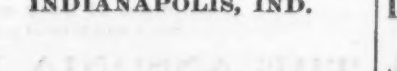
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Hibbard, Spencer & Co., Chicago, have  
sold our Casters as follows:  
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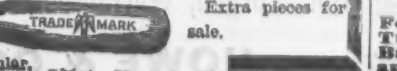
WROUGHT IRON  
ADJUSTABLE  
Made with two Right Wheels or with  
Martin's Patent Casters.



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## MARTIN'S ENGLISH HORSE CLIPPERS.

Recommended as  
the best Hand Clip  
per made.  
Extra pieces for  
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Send for circular.

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The backstrain when the wrench is used is borne  
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The strongest Wrench made, and the only suc-  
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None genuine unless stamped

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Our Agents, GRAHAM & HAINES, 113 Chambers St.,  
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IT HAS  
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Wrought Bar, Head  
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Owing to the in-  
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Popular Wrenches,  
we are now manu-  
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Full Leather, \$7.50. Half Leather, \$5.50.  
Pocket Edition, Full Leather, \$3.50.  
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Address all orders to Pope & Stephens, General  
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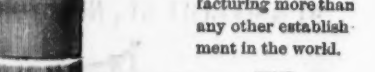
103 Reade Street, New York.  
Manufacturers of and Wholesale Dealers in  
Cotton and "Long Flax" Sail Duck,  
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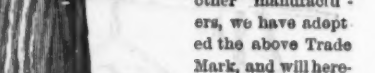
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## Solid Cast-Steel Pump Augers

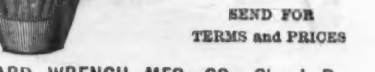
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and Lathes.



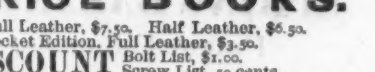
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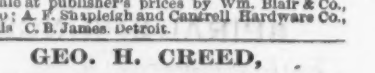
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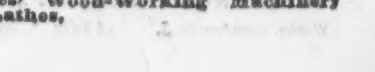
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and Lathes.



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1837.



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HALL, ELTON & CO., Wallingford, Conn., and 75 Chambers St., New York.

## HOLMES, BOOTH & HAYDENS,

MANUFACTURERS OF

## Finest Quality Silver-Plated Spoons, Forks, Knives, &c.

"JAPANESE"  
PATENTED."JAPANESE"  
PATENTED.

NOTICE.—We guarantee the base of our Spoons, Forks, &c., to be full 18 per cent. Nickel Silver, and extra heavily plated with pure Silver. Our goods are all hand finished, and are first-class in every respect. We pack our Spoons and Forks one dozen in each box.

49 CHAMBERS ST., NEW YORK. } Factories, } 18 FEDERAL ST., BOSTON.  
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## T. G. CONWAY, 88 Chambers Street, New York,

Manufacturers' Agent for

REVOLVERS, BREECH-LOADING GUNS, TABLE CUTLERY,  
CAST IRON, NICKEL PLATED & STEEL SHEARS.

Representing THE LEE ARMS CO.,  
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## Escutcheon Pins, Small Rivets and Screws,

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Baltimore, Md.



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Manufacturers of

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and also a large variety of other styles of Snaths  
Springfield, Vermont.  
Represented in New York by Lamson & Goodnow Mfg. Co.

large and prosperous business on an old and favorable reputation.

NEW YORK.

The Albany and Rensselaer Iron and Steel Company have decided to build a new cupola at the Bessemer Steel Works. The supplementary machinery at the steel works is more than sufficient to dispose of the iron melted in the three furnaces, and no additions will be necessary. The new cupola will cost about \$6000. It will be similar in model and dimensions to those now in use. The four will be capable of melting about 3500 tons of iron a week.

All departments of the Burden Iron Works, at Troy, are in operation at full capacity.

The loss incurred by the fire at the Poughkeepsie Glass Works, on Dec. 2, was not nearly as great as was reported, being only about \$70,000, of which \$60,000 was covered by insurance. The owners of the works are Ely, Son & Hoyt, part of the capital being supplied by persons in Clyde, N. Y. The works will be rebuilt.

NEW JERSEY.

Whitall, Tatum & Co., at Millville, have now seven flint glass furnaces in operation, with an eighth fired up and almost ready to commence work. They employ in these works about 1000 hands.

PENNSYLVANIA.

Chester and Montgomery County papers have published an item that the plumbago mines and works of the Pennsylvania Graphite Company, near Byers Station, Chester County, had been sold to a party of gentlemen in New York, who will take possession on the 1st of January next. This is denied by members of the company in this city, although several members have sold out their shares and retired, and a reorganization of the company is about being effected. The establishment will be controlled by Pennsylvanians, as heretofore. Most of the members of the company reside in Reading.

Atkins' rolling mill, at Fishbach, Schuylkill County, is now lighted by six electric lamps by the process of the Maxim Electric Light and Power Company.

The Sharon Boiler Works delivered three 7-ton iron and steel double-flue boilers to Kimberly, Carnes & Co. this week.

F. P. Heller, a prominent member of the Board of Trade, is at the head of a movement to organize a company with \$15,000 to \$20,000 capital, for the establishment of glass works in this city, for the manufacture of bottles or glassware. He says he will put in several thousand dollars if four or five other gentlemen will each take \$2000 or \$3000 worth of stock to start with. He remarked to an Eagle reporter last evening that he "knew glass works would pay." He has selected a site which, in his opinion, would be an excellent one for the manufactory.—Reading Eagle.

It is reported that the Reading Iron Works intend to erect a large mill in Reading for the manufacture of iron pipe of different sizes for gas, steam, water and oil; that the old pipe mill on the south side of South street will be removed so as to give room for the enlargement of the rolling mill and nail works, and that the manufacture of nails, which has been suspended for some time, will be resumed and conducted on a larger scale than ever before. An additional building for same purpose will be erected on the eastern side of South Seventh street by the company, as it is said they desire the privilege of laying another railroad track across South street at or near Seventh.

The machinery at the Rockland Furnace has been removed, and will be sent to Virginia.

The Youghiogeny Water Works Company at Bradford is now in operation, the pipe being laid to the summit, 2½ miles, where the reservoir of 2,000,000 gallons capacity is situated. The pumps and engines, two in number, and of a recent patent, were manufactured by Cope & Maxwell, of Hamilton, Ohio, each having a capacity of 2000 pounds every 24 hours. The works thus far, including pumps, engines, pipes (20-inch), tankage, building, &c., have already cost the company the sum of \$75,000. The works are located at what is called the Slope Mine, where a neat and substantial building, of a hard blue stone, 42 x 30 feet, has been erected, in which the pumps are now in operation. In this building there is a well 30 feet deep by 12 feet in diameter, walled up and cemented. From this well there is a tunnel 5 x 3 feet leading to the river, a distance of 100 feet. In this tunnel the water pipe, 20 inches in diameter, is laid, which feeds the well from a natural basin in the river some 20 feet deep. To prevent the well from being flooded during high water there is a cut off in the feed pipe by which the water is regulated. The water here is the best and purest that can be found anywhere—pure Youghiogeny water fresh from the mountains. These works now furnish water for the following coke works of H. C. Frick & Co., viz.: The Henry Clay mines, 100 ovens; Frick mines, 106 ovens; Morgan mines, 164 ovens; Foundry mines, 74 ovens; White mines, 148 ovens; Eagle mines, 80 ovens; Summit mines, 142 ovens. Besides the reservoir at the Summit of 2,000,000 gallons capacity, there is already tankage along the line of 1,110,000 gallons capacity.

There were manufactured at the nail factory of the E. & G. Brooke Iron Company in November 21,000 kegs of nails. The shipments for the same month amounted also to just the figure, 21,000 kegs. The demand still continues brisk, and the works are running to their full capacity.

The report clipped from an exchange and published in our last regarding the rebuilding of the stove works of Keely & Co., at Spring City, is incorrect, as Mr. Keely himself informs us that as yet even the site of the works has not been decided upon, though the works will certainly be rebuilt. The works may be rebuilt in Norristown.

The company formed to lease and operate the Clara Furnace, at Newcastle, consists of Messrs. J. N. Glidden, of Cleveland, and Henry Wick, Myron C. Wick and Robert Bentley, of Youngstown, Ohio. The furnace has been overhauled and put in complete working order. It was formerly operated by Raney & Berger.

**PITTSBURGH AND VICINITY.**  
Bozennie, Maloney & Co. have quite a number of orders on hand for their glass

house pots, and having a fair stock now on hand, are prepared to meet all requisitions.

Elsewhere will be found an extended account of the burning of Graff, Bennett & Co.'s Millvale mill. The official report of the insurance makes it \$164,000. The loss is not yet exactly known.

O'Leary, Beck & Co. are running full time on window glass, and report trade very good for the season. Their works are at Monongahela City.

The new plate-glass works at Hites Station are in full operation. They cover eight acres of ground.

We are informed that Moorhead & Co. are about to erect some new puddling furnaces.

W. McCully & Co. are running their two new furnaces on Twenty-eighth street full time and are pressed with work. This factory was entirely rebuilt last summer, and is now one of the finest in the country.

On the evening of Friday, the 9th, a boiler explosion occurred at the works of the Keystone Rolling Mill Company, limited, on Second avenue, near Soho. There were three batteries of boilers in the mill, and the explosion occurred in two of the middle battery. The destruction caused was very great, pieces of the boilers being thrown for great distances, and showers of bricks falling in every direction. The boiler house was torn to pieces, and the blacksmith shop totally demolished. About eight men were injured by the explosion, one dying instantly and another the next morning. At the Coroner's inquest the chief engineer testified that the boilers, although old, had been recently inspected and found to be in good condition: that they had been repaired a few days before the explosion, and that when he left the boilers on the evening of the explosion there was plenty of water and the valves were all right. The manager and other employees also testified that they could assign no cause for the accident. The inquest has not yet been concluded. Repairs will at once be commenced, but the mill will necessarily be idle for some weeks.

In addition to the ten new puddling furnaces, mentioned in our last, which Wilson, Walker & Co. are erecting, they will shortly put up a three-high muck mill and a new engine and squeezer.

It is reported that Long & Co. (formerly Park, Long & Co.) will erect a rolling mill near McKee's Rocks, below the city. The report, however, lacks confirmation.

Singer & Nimick are building another melting shop in connection with their steel works. The size of the building will be 40 x 60 feet.

OHIO.

The Springfield Malleable Iron Works, at Springfield, have been crowded with work all this year, and the present prospect is for a still heavier trade next year. The immense malleable iron works of the Champion Mower and Reaper Company have also been running to their full capacity to supply castings for the company's machines, and at the present rate of the production of Champion machines, these works will have to be materially increased in capacity during the coming year.

The Ironclad Furnace, near Steubenville, has been sold by the sheriff to Henry M. Long, of Pittsburgh, for \$46,340. The purchase includes 1000 acres of coal and ore lands, with furnace, rolling mill, houses, &c., all in good order.

Howard Furnace will likely get her repairs completed and blow in the latter part of this week.

Ground will be broken Monday for a blown glass works at the corner of Slack street and the Panhandle Railroad. The plans call for a building 40 x 60 feet, and will be enlarged somewhat over these dimensions, which do not include sheds. The stack will be 30 feet high, with enough shops to employ 40 hands. Fine blown glassware will be made, especially fine goblets. Wm. Fox & Co. are the proprietors, and Ed. Nicholson and Robert Hyde have the contract for building.—Steubenville Gazette.

The Tiltonville people appear to have become dissatisfied at the lack of energy shown by the Wheeling Mutual Glass Company, and a delegation came down during the week to obtain the deed for the property at Tiltonville, which was in the hands of some of the stockholders here. They propose, as we are informed, to pay off all claims against the property, and offer it as a free gift to any party or firm who will push the project to completion. We hope this liberal offer will find a taker.—Martin's Ferry Times.

The Akron Iron Company have contracted with the Cuyahoga Works, of Cleveland, for one of their large rolling mill engines to take the place of their present engine, which has become too small for their increased demand. The company's business on their patent hot-polished shafting is constantly increasing.

Portsmouth Foundry and Machine Company have the contract for the castings for a large furnace at Goshen, Va.

The Tyler Hoe and Tool Works are to be sold.

WEST VIRGINIA.

On the night of the 11th the machine shop belonging to the Whitaker Iron Works, Wheeling, was discovered to be in flames. The shop was a wooden building, about 40 by 60 feet, situated on the creek, between the office and the mill, and contained planes, lathes, drills and a small steam engine. No definite theory is advanced concerning the cause of the fire. The fire department responded promptly, but were unable to save anything on account of the rapidity with which the building burned, and its contents being completely destroyed in half an hour. The loss is estimated at \$2500, fully covered with insurance, which is distributed among a number of companies.

KENTUCKY.

During the week ending December 3 the Norton Iron Works made 4175 kegs of nails and shipped 5700 kegs. The furnace during the week made a daily average of 50 tons of good pig iron. The shipments of pig iron amounted to 223 tons.

Hunnell Furnace, Greenup County, is still turning out her usual average of some 17 tons per day.

Ashland Furnace is still in fine working condition, making in seven days 438 tons



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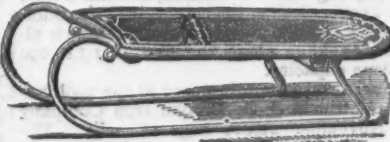
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HOT BLAST AND WATER TUYERE IRONS,  
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All Steel, Blade 12 inches Wide.

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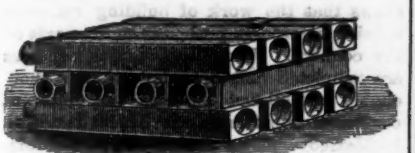




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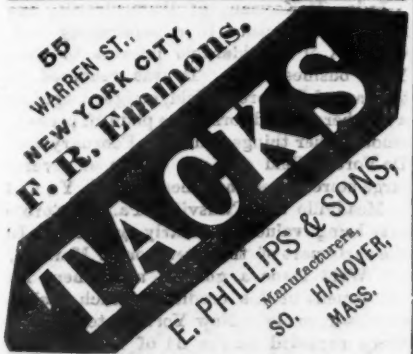


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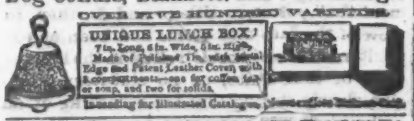
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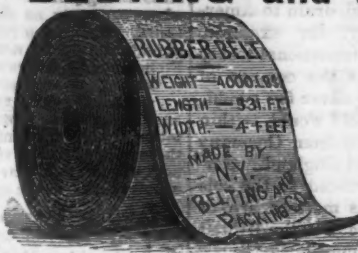
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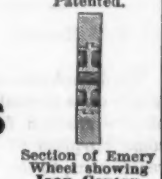
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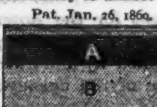
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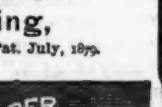
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**PHOSPHOR-BRONZE.**

and a fraction over one-fourth of a ton. The shipments of iron from this furnace during the week ending Dec. 3 amounted to 852 tons.

Pennsylvania Furnace is doing good work, making a daily average of about 13 tons of excellent iron. Her present blast will probably close early in February.

GEORGIA.

The foundry and machine shops of Stevenson & McIntyre, Cartersville, will soon commence the molding of car wheels for the car factory. They have orders far ahead.

ALABAMA.

The Woodstock Iron Co. have bought the furnace, real estate and stock of the Alabama Iron Co., paying \$100,000 for it. The furnace is located 10 miles south of Anniston. This trade gives the Woodstock Iron Co. three furnaces, all making car-wheel iron, and an estate of 40,000 acres of wood and mineral lands, with control of one of the finest deposits of brown ores in the South.

TENNESSEE.

Furnace No. 1, at Rockwood, has been finished and dried out, ready to start. It is thought it will make at least 50 tons of iron per day.

The South Pittsburg furnaces are compelled for want of coke to run on short time. The company hope soon to have the road through to their immense coal and iron beds. The Warner Furnace, in Hickman County, which was recently blown in, is 11 x 55 feet, will turn out, as a charcoal furnace, 20 tons of iron per day, but as a hot blast furnace its capacity would be from 40 to 50 tons per day. Four hundred men are employed in and about the furnace.

The Wilder Machine Works at Chattanooga have been leased for a term of years by S. B. Lowe & W. A. L. Kirk. These works are well equipped and will doubtless have plenty of orders to fill.

ILLINOIS.

The Union Iron and Steel Company are erecting a one-story boiler house, 65 x 125 feet, also merchant iron mill, 203 x 170 feet, on Ashland avenue, near Archer, Chicago, to cost \$25,000.

Messrs. Shumway, Burgess & Co. are putting in their works three new bolt headers. They are very full of orders.

The Northwestern Screw Co., of Chicago, a new organization, now occupy their new building on Loomis and Taylor streets, 50 x 80 feet, and have put in improved machinery for manufacturing all kinds of wood screws and special lines of steel, blue and brass screws for railroad work, for which they are now prepared to fill orders. The company is incorporated with a capital of \$50,000, with C. F. Wardell, president, and H. N. Hinckley, secretary and treasurer.

Messrs. Samuel Reid & Co., Chicago, manufacturers of the improved Reid lubricator, report they are very busy shipping their lubricator to all parts of the country. They are at present turning out 100 a month, which, with the increased facilities they are now arranging for, will be increased to 200.

The Chicago Steel Horse Shoe Company are making a number of additions to their plant at Kensington, to include 14 new drop hammers, two of which will be the largest in the country used for that purpose, their bases weighing 10 tons each, and hammers 2500 pounds each. They were manufactured by the Columbian Iron Works of Chicago. They are also putting in a number of machines from the Pratt & Whitney establishment for doing all kinds of drop forging, four new bending machines, one 200-horse-power engine, in addition to the one already in use, six trimmers and six punching machines.

The Calumet Iron and Steel Company have under way, at the works formerly owned by Messrs. Jos. H. Brown & Co., at Ironville, a number of additions, improvements, &c. To the nail department is being added an extension to the present building, which, when completed, will give them one of the largest nail factories in the country; its dimensions will be 308 feet in length and 100 feet in width. In this they will have running 150 machines, an increase of 63 over the number now employed, giving them a capacity of 1400 kegs of finished nails per day. The bar and plate mills will be enlarged from a capacity of 110 to 175 tons per day, for which are now being erected 16 additional puddling furnaces, making 48 in all. They have also ordered 20 extra gas producers (Siemens' patent). The blast furnace, 18 x 75 feet, and now producing 100 tons a day, will be increased to 125 tons as soon as the additional engine, with an 84-inch blowing and 38-inch steam cylinder, now in course of erection, is in running order. Four new boilers will be added to the battery of 32 now in use, besides a number of minor improvements. The company now employ over 900 hands, day and night, and report a season of prosperity never enjoyed by the former owners.

The Illinois Zinc Co., of Peru, have taken possession of the old buildings and furnaces of the Kinsman Zinc Factory of LaSalle, which have been standing idle for over a year, and intend running them in connection with their very extensive works at Peru. The company's new rolling-mill building is virtually finished, and the engine, one of some 300 horse-power, is being set up. The rollers and their machinery will be delivered soon.

Palmer & Kerr's plow factory is to be removed from Waukegan to Winona, Minnesota.

The Union Foundry and Machine Co., of Rockford, gives notice to the Secretary of State of an increase of its capital stock to \$25,000.

The proprietors of the Northwestern File Works, of Chicago, are engaged in making extensive additions to their establishment. The augmentation in machinery will greatly increase the facilities of the works.

The Berger Tool Co., of Batavia, has been organized with a capital of \$10,000.

The Superior Barbed Wire Co., of DeKalb, commenced operations Sept. 1, employing 16 men, and have just added 20 more automatic barb wire machines. Their works are those formerly occupied by I. L. Ellwood & Co., and have room for 40 machines. The capacity of the works, which are 80 x 150

with wing 20 x 40 brick, two stories, is 3000 tons per annum.

INDIANA.

The Atlas Engine Works, of Indianapolis, are to furnish Messrs. I. R. Allen & Co., of that city, with one of their standard 60-horse-power engine and boiler outfits complete for their new sawmill in Kentucky. They have also just received an order from H. C. Long for a 40-horse-power outfit complete for a similar purpose.

The Indianapolis Steel Rail Mill have just purchased an engine and boiler outfit from the Atlas Engine Works.

WISCONSIN.

The new addition to the Whitaker Engine and Skein Works, Keweenaw, is finished and the machinery in place.

MISSOURI.

The Missouri Stove Foundry Company (Gage's) have secured a suitable location for their new works on the south side of the old Manchester road, between Missouri and Chouteau avenues, and are now preparing to build at that place. Their foundry has been begun, the cost of which will be \$10,000.—Age of Steel.

The works of the Helmbacher Forge and Rolling Mill Co. are being pushed to their utmost capacity on car axles and coupling links and pins.

The St. Louis Stamping Company are erecting additional works on their premises in St. Louis which will cost about \$5000.

A St. Louis press dispatch says the consolidation of iron manufacturing companies, under the title of St. Louis Steel and Ore Company, is almost perfected. The total stock is \$5,000,000, of which the Pilot Knob Company has been allotted \$1,472,000, and the Vulcan Company \$1,164,000. In addition, the indebtedness of the Vulcan Company, consisting of 8 per cent. mortgage bonds of \$1,000,000, due in 1885, has been assumed by the consolidated corporation. The Grand Tower Mining Company's estate will be sold under mortgage and purchased by the trustees, and its rate will be apportioned to a capital of \$1,000,000. The capital not allotted, \$1,354,000, will be retained in the treasury. It is said the Vulcan will be converted into a steel rail mill of capacity sufficient to supply the Gould syndicates of the Southwestern railroads with rails at the very lowest cost.

A. Leachen & Son, St. Louis, received four first premiums at the St. Louis fair this fall for the best displays of wire rope and cordage, hemp packing, bell and sash cord and twine. They report a heavy pressure of orders.

MICHIGAN.

The Michigan Car Company's Works, at Detroit, covers 25 acres of ground and employs 2000 men. The Detroit Car-wheel Company, the Detroit Iron Furnace Company, and the Baugh Steam Forge Company are auxiliary concerns. The magnitude of the operations of the Michigan Car Company may be imagined when it is stated that it will complete this year about 6000 freight cars, requiring in their construction over 35,000,000 feet of lumber, and between 40,000 and 50,000 tons of iron and steel.

The repair work done by the Michigan Car Company aggregates about \$500,000 per annum. The Baugh Steam Forge Company manufactures 40 tons of iron per day, and turns out 100 axles. The business of the three companies enumerated above will aggregate at the lowest estimate \$6,500,000 this year—a showing that is probably unequalled by any similar works in this country or in England. The Detroit Car-wheel Company is making 300 perfect car wheels per day, a total during each month of 2000 tons of wheels, in addition to a daily product of about 80 tons of miscellaneous castings for cars, locomotives, &c.

The Michigan Carbon Works, of Detroit, have just placed two more link belt elevators from Chicago in their new works, making seven in all.

The blast furnace at Florence was damaged slightly by fire on Saturday, December 3. The loss was nominal.

Repairs are being made to the Pacific Furnace, with a view to the relighting of the fires at an early day.

COLORADO.

Robert H. Lamborn writes to the Bulletin of the Iron and Steel Association as follows concerning the operations of the Colorado Coal and Iron Company: "We have ordered foundations put in for our second furnace, at Pueblo, and have the machinery under way. We are preparing to put on a night turn on the Denver Rolling Mill, at Denver, for rolling iron rails and making bar iron. We cannot keep up with the demand without doing this."

### LABOR AND WAGES.

The Iowa miners have held a convention and appointed a State organizer at \$65 a month and traveling expenses. They drafted a bill for the creation of a Bureau of Labor Statistics and recommended the adoption of the 9-hour system.

The boys at the Cohansey (N. J.) Glass works were on strike for an advance of wages. They were out three days. The firm gave some of the oldest boys their wages, and the rest resumed work at the old wages.

The striking coal miners of the Belleville, Ill., district have asked that a committee of business men of Belleville, not concerned in the coal trade, be appointed to settle the difference now existing between the miners and operators by arbitration.

Mrs. Chisholm, widow of the late Henry Chisholm, Cleveland, Ohio, ordered all hands paid for the four days' time lost at her husband's death.

The mill at Hollidaysburg, Pa., is on a strike against the discharge of some men, it being claimed that they were discharged for belonging to the union.

The cold-feeders at Wheeling, W. Va., are still on a strike.

Last year the German wire mills supplied England with 30,000 tons of wire, and Russia with 40,000 tons. France received from Germany from 12,000 to 15,000 tons of steel wire for sofa springs, and America not less than 30,000 from the same source.



# The Iron Age

AND  
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## CONTENTS.

First Page.—Thompson's Patent Pulverizer. Scientific and Technical. Steel for Ship Plates. A Phosphor-Bronze Steam Yacht.  
Third Page.—An Improvement in Annealing Furnaces. The Austrian Iron Trade.  
Fifth Page.—Account Books as Evidence. Reclaiming Goods Before Delivery.  
Seventh Page.—Management and Use of Ropes.—I.  
Ninth Page.—Management and Use of Ropes.—II (Continued). The Huntington Emery Wheel Dresser. Industrial Items.  
Eleventh Page.—Industrial Items (Continued).  
Thirteenth Page.—Industrial Items (Continued). Labor and Wages.  
Fifteenth Page.—The Gold Drain in Its Effect in Europe. Mr. Morrell on Steel Blooms. Liability of Commercial Agencies for False Ratings. Responsibility of Directors. Railways in Mexico.  
Seventeenth Page.—Gothics and Puddling Rolls.  
Nineteenth Page.—Gothics and Puddling Rolls (Continued). The Coal Trade of Cincinnati. Burning of the Millvale (Pa.) Mill of Graft, Bennett & Co.  
Twenty-first Page.—Trade Report. General Hardware.  
Twenty-second Page.—British Iron Market. Iron.  
Twenty-third Page.—Metals. Coal. Foreign Trade Movements. Imports. Exports. Old Metals. Paper Stock, &c. Philadelphia.  
Twenty-fourth Page.—Philadelphia Concluded. Pittsburgh. Chicago. Chattanooga. Boston. Cincinnati. Louisville. St. Louis. Baltimore. Our English Letter.  
Twenty-sixth Page.—Our English Letter (Continued). Foreign. Poets for Barbed Wire Fences.  
Twenty-seventh Page.—The Iron Age Directory.  
Thirtieth Page.—New York Wholesale Prices.  
Thirty-first Page.—New York Wholesale Prices (Continued).  
Thirty-second Page.—New York Wholesale Prices (Continued).  
Thirty-third Page.—Philadelphia and Pittsburgh Hardware and Metal Prices.  
Thirty-fourth Page.—Boston Hardware and Metal Prices.

The London *Times*, speaking of our tariff, reminds British manufacturers that it will be unwise to deceive themselves with the expectation of any speedy movement toward free trade in America, and adds: "Some day the Americans will recognize the 'futility of battling against economic law' and will perceive the waste of nations' energy which protection involves." Well, perhaps this is true; but while we are enjoying substantial material benefits from our futile battle, and developing a mighty national energy under a policy which makes labor honorable and production profitable, we are not likely to regard protection from a British point of view. There may come a

time for us, as it has come for England, when protection would be ruinous and all our interests would depend upon free trade with other countries. If so, there is every reason to believe we shall recognize our best interests when we see them. That is just what we do at the present time. It is extremely difficult, however, to convince our English friends that the average American citizen is not one of those who "don't know his daily bread when he sees it."

## The Gold Drain in Its Effect on Europe.

In an article headed "Production of the Precious Metals and of Quicksilver," published in our issue of November 3d, we availed ourselves largely of Dr. Soetbeer's gold and silver statistics. This gentleman has recently addressed a letter to a leading Vienna paper, entitled "The Gold Drain to the United States," which we find valuable, not only on account of the correct statistics and appreciation of our monetary situation it contains, but in view of the conclusions the learned professor arrives at. After showing that the public debt of the United States has been reduced from \$2,756,430,000 on August 31, 1865, to \$1,840,599,000 on July 1, 1881, while the interest thereon fell from \$150,978,000 in 1865 to \$75,019,000 in 1881, and the income increased from \$322,031,000 in 1865 to \$363,500,000 in 1881, he shows that the surplus of export over import rose as follows, in the fiscal years below:

Fiscal year.	Import.	Export.
1874-75.	\$26,300,000	\$51,200,000
1875-76.	27,800,000	57,800,000
1876-77.	26,600,000	64,600,000
1877-78.	26,700,000	67,700,000
1878-79.	25,900,000	70,000,000
Total.	\$1,127,300,000	\$2,127,300,000

As the gradually lowered interest on United States bonds and the high price they nevertheless commanded, caused European holders to return them for sale while Europe drew from here large excesses of products; the reduced remittances of gold to pay interest on our bonds there caused the import of the precious metals to square balances with us to greatly exceed our export thereof during the last two years, as shown by the following table.

Fiscal year.	Import.	Export.
1874-75—Average.	20.5	75.6
1875-76—Average.	21.8	71.8
1877-78.	20.8	70.2
1878-79.	20.8	70.2
1879-80.	20.8	70.2
1880-81.	20.8	70.2
1881-82.	20.8	70.2

In this manner a gold drain was started, depleting the European banks and causing a corresponding accumulation of gold and silver in the United States. In 1876 the Bank of France, for example, held 1,530,000,000 francs in gold; on October 6, 1881, it held only 627,000,000. In the United States, on the other hand, the stock of coin stood as follows:

	Gold.	Silver.
June 30, 1873.	\$135,000,000	\$5,000,000
June 30, 1874.	152,000,000	8,800,000
June 30, 1875.	149,300,000	16,600,000
June 30, 1876.	153,500,000	22,400,000
June 30, 1877.	193,000,000	21,800,000
June 30, 1878.	247,000,000	30,400,000
June 30, 1879.	286,000,000	212,100,000
June 30, 1880.	320,000,000	179,000,000
May 1, 1881.	320,000,000	179,000,000

Another report estimates that from January 1879 to July 1, 1881, gold circulation increased in the United States \$262,000,000, while there were coined \$70,000,000 of silver, which would agree with the above table. It is also estimated that for industrial purposes the consumption of gold has of late largely increased, amounting at present to \$1,000,000 per month. In view of all the facts, Dr. Soetbeer gives it as his opinion that during the next few years the gold drain from Europe to the United States may possibly continue uninterrupted, if the trade balance in its general features remains as it has been the last three years, but the volume of the drain, he adds, is bound to decrease in consequence of the preference given to paper money in the United States in every-day use, and the excessive accumulation of gold in banks which will result therefrom. It cannot be supposed, he says, that the American banks, already feeling uncomfortable with a gold stock of only \$115,000,000, will quietly permit a notably larger accumulation. On the contrary, they will endeavor to find a more profitable employment for this gold surplus elsewhere.

The consequence of a plethora of gold in America and a continued dearth of it in Europe would forcibly depress the interest rate there, while causing a rise in prices and wages, but in Europe, on the contrary, both prices and wages would decline, and at the same time interest would advance, though the facility of trade and credit exchanges between both hemispheres, and the international character of enormous amounts of solid securities would, of course, gradually bring about an equalization. The time it may take, and the many disturbances that may intervene before such an equalization will finally be reached, it is useless to try to predict, but the eventual restoration of the equilibrium is nevertheless certain to come. A universal scarcity of gold cannot take place, since between 1849 and 1880 such enormous quantities of it have been taken from the earth and thrown upon the world's markets, even if the production of gold should in the future sink to an average of less than \$100,000,000 annually. A more moderate production of gold need not cause any apprehensions as to the stability of the purchasing power of money. Where solid banking and a solid system of credits prevail, the real circulation of gold coin in general intercourse will have a tendency to decrease, and gold will chiefly be used as a bank reserve.

The learned professor then attacks bimetalism, winding up with the following remarks: "We are unable to understand how bimetalism can be made to improve in favor of Europe the balance of payments between it and the United States, and thus prevent the gold drain to America. Should Germany, for example, either by virtue of an international treaty or without such, resume the coinage of silver at the rate of 15½ silver for 1 gold, its entire stock of gold coin would, within a short space of time, flow from Germany to the United States and England. Germany would then be reduced to the sole silver standard, and, as matters are at present, it will be as good if the United States continue to coin monthly \$2,300,000 in silver dollars for some years to come. Meanwhile, it will be advisable that the authorities at Berlin avail themselves of the opportunity for selling out for account of the empire about 200,000,000 marks worth of silver thalers. The Imperial Bank of Germany should do its utmost to bring about this sale, for, as matters stand in the United States, it is well that Germany should get rid of the old silver." This goes to show that Dr. Soetbeer has studied the monetary question very thoroughly, and that he indulges none of the dangerous illusions of those who advocate bolstering up silver by legislation.

## Mr. Morrell on Steel Blooms.

We do not like to base criticisms or comments on a partial knowledge of facts and of the reasons for them, but we confess some surprise at the information which reaches us, to the effect that Hon. Daniel J. Morrell has appeared before the Secretary of the Treasury in the steel bloom inquiry as a witness to support the claim of the importers that steel blooms should not pay a higher duty than 45 per cent. ad valorem. We are informed that Mr. Beaman, who represented Messrs. Clark, Post & Martin, introduced Mr. Morrell in words to the following effect: "Here is a gentleman who two years ago appeared at the head of a delegation claiming that all steel blooms should pay a duty of 2½¢, but who now comes to say that our position was right and that they should pay a duty of 45 %." Our Washington correspondent informs us that Mr. Morrell's change of front caused much surprise among the old Treasury officials who were present.

The verdict of the trade will probably be that Mr. Morrell's present position is inconsistent with that assumed by him two years ago. We do not know, however, that this verdict could be fully sustained by the facts. When Mr. Morrell came before the department in 1879, with other manufacturers of steel, to oppose a Treasury ruling which would admit steel blooms at a lower rate than 2½¢ cents, his argument, as we remember it, was based solely on the effect of such a ruling upon the industries of the country. He gave his reasons for believing that a change in the duty would be attended with widespread disaster to the Bessemer steel interest, and would throw out of employment 100,000 men then earning \$55,000,000 a year in wages, besides imperiling large amounts of capital invested in mines, furnaces and steel plant. We did not think this a proper line of argument to address to the Treasury officials, whose only duty is to correctly interpret the law and enforce its provisions, and we said so at the time. What Mr. Morrell then thought as to the meaning of the law, he stated very fully in an interview with our reporter, published in *The Iron Age* of November 6th, 1879, from which we quote as follows:

Reporter.—I should like to know, Mr. Morrell, if you have any criticism to offer upon the recent decision of the Treasury Department fixing the duty on steel blooms at 45 per cent. ad valorem?  
Mr. Morrell.—I think it is all wrong, and certain to be very injurious. The Bessemer steel blooms brought in under this decision are partially manufactured rails. At 45 per cent. ad valorem the duty will be about one-half of 1 cent per pound, while rails are charged 1½ cents per pound. The difference in the duty on the two products is \$1.75 per ton. As these blooms can be made into finished rails at a cost of about \$3 per ton, the result will be that great quantities of blooms will be imported to be finished here as rails. It is a serious blow to our iron and steel industries.  
R.—Is not the law as it stands obscure or unsymmetrical?  
Mr. M.—I think not. It is true that steel ingots are rated at 2½¢ cents per pound, while rails are 1½¢ cents per pound, but when this duty upon ingots was imposed Bessemer steel ingots were not known commercially, and it applied to crucible cast steel, which is a more costly metal. I have never claimed myself that the duty of 2½¢ cents on steel ingots should be applied to Bessemer blooms.

R.—What are they?  
Mr. M.—Ordinarily they are produced in manufacturing steel rails. The steel as cast in its first form is called an ingot, which is reheated and rolled down to a convenient size, and out to proper lengths for rolling at another heat into railroad bars. When so cut to lengths for one or more rails these pieces are called blooms, but they might be called bars, unfinished rails, or by any other name. You have in the bloom fully eight-ninths of the labor and expense of producing a rail.

R.—Are they not used for other purposes than rails?  
Mr. M.—They are, but it is well known that the importations are for manufacture into rails. The duty on rails is the lowest imposed on any manufacture of steel, and the importer of blooms, therefore, could not complain if this duty were imposed on his blooms, especially if he proposes to use his blooms for articles of higher cost and bearing a higher duty. The appearance of the bloom, its shape, the method of its manufacture and its use generally made of it, stamp it as an unfinished rail. If one is very anxious to see something else in it he can do so, but that, at least, must be seen, unless blindness is willful.

R.—I observe that Judge French concedes this, but says the rail duty would be prohibitory, and should not be adopted unless the demands of the law imperatively require it.

Mr. M.—A very poor reason I think. The object of the tariff is not to encourage importations, but to afford protection. Its protective character is strongly marked in the almost invariable advance of duty as the article is advanced in value. The duty on rails does not prohibit their importation; they are coming in, and Judge French merely allows steel to be brought in, in blooms, at an excessively low duty, instead of rails at a duty which the article can bear. Unless the result is an enormously increased importation, the Government will lose revenue, and if there is an enormous increase, the injury to business will be such that the Government and the country must, in the end, suffer by it.

Carefully examining the above, we find that Mr. Morrell was evidently impressed with the idea that, whatever the law, it should be interpreted and administered by the Treasury Department in the interest of domestic manufacture. This is an opinion which, we think, might easily be changed on reflection; but from such information as we have at command at this time, we are not prepared to say that Mr. Morrell's opinion as to the duty the law imposes on steel blooms is not the same to-day as it was in 1879, when he distinctly said: "I have never claimed myself that the duty of 2½¢ cents on steel ingots should be applied to Bessemer blooms."

## Liability of Commercial Agencies for False Ratings.

A case of much importance, defining the liability of commercial agencies for misinformation given their clients, is now on trial in England. It is one in which the proprietors of Stubbs' Mercantile Agency have applied for a new trial, on an issue decided against them, with a verdict for £309,776, a short time ago. In the original case the defendants were sued by Mr. Nordberg, the London agent for the Rosendale Fabrikker Actie Bolag, of Gothenburg, Sweden, for losses sustained by him owing to the alleged negligence of the agency in sending him what proved to be an inaccurate report as to the solvency of a firm inquired after. The plaintiff subscribed to Stubbs' Agency, and asked them if a firm styled "J. & C. Christie," of Glasgow, were good for a credit of £300. The defendants' answer was: "Our inspector reports—'Some time in business as commission agents; considered respectable, and reputed good for the amount.'" The plaintiff, therefore, gave the credit asked for, but it subsequently transpired that there was no such firm in existence, but only one person, named James Christie, constituted it. He had suffered sequestration in 1870; had compounded with his creditors in 1874 for 4/3 in the pound, which had never been paid; and had since suffered a second sequestration. Mr. Nordberg, having lost the amount for which he trusted Christie, sued Stubbs' Agency, and, as stated, obtained a substantial verdict. The application for a new trial made by the defendants relied upon certain provisos in their prospectus, and a foot note printed on their memoranda forms, the latter stating: "In furnishing information, no guarantee is given against the possibility of mistake or loss." Upon this foot note the whole question virtually centered, and the court naturally took time to consider the matter prior to delivering judgment.

A very similar case has lately been decided in the New York Court of Appeals. The plaintiff had sold goods on credit to a firm on the strength of a favorable report from Dun, Barlow & Co. This report was based on information given to the agency by one of the members of the firm, and was subsequently found to be false. A cross-action was therefore entered "for deceit" against the firm who obtained the credit. The defense was that there was no liability because the representations had not been made direct to the selling house. The Court of Appeals held that this was not a valid defense, and that an action would lie against any person making false representations to a commercial agency by any subscriber to such agency who had been thereby deceived. Such cases are of immense importance to the business community, as the commercial agency has become an important part of our business system, and the value of its ratings will never be accurately known until the exact measure of liability for false or misleading information is determined. It is also important that business men should know what recourse they have against agencies which give them an undeservedly low rating, and how far such misinformation can be covered by the plea of "privileged communication." It is true that the information given a subscriber is intended to be confidential, but it usually creates an impression in the mind of the person to whom it is given, and is very likely to influence the opinions he may be called upon to express, as well as his own policy in dealing with the house unfavorably rated. It is extremely difficult, of course, to fix the nature and extent of injury done by an unfavorable report, for the reason that if it leads to disaster or embarrassment the statements of the agency, and any distrust thereby created, would be vindicated by the actual happenings. Decisions bearing on these questions are of great interest to the business community, and the fact that so few questions of this kind have come before our courts reflects much credit on the general management of our commercial agencies.

## Responsibility of Directors.

The recent disclosures of fraud and mismanagement in national banks at Newark and Boston are availed of by Mr. Knox, Comptroller of the Currency, to call special attention to the duties of directors in such institutions. Directors are responsible for the funds committed to their care, and if it can be shown that they had notice of illegal transactions, it is a serious question whether they are not bound to make good not only any direct losses that may occur, but any other losses resulting from a neglect of duty. The Comptroller contends that the bank examiner must necessarily depend on the directors for a thorough analyzing and scrutiny of accounts, to be made periodically by a competent committee. Moreover, it is the duty of directors to keep themselves informed of the habits and character of their employees, lest they engage in speculations or become lax in the performance of their duties. In the case of the Newark bank, the examiner was deceived by forgeries which the most thorough experts might have failed to detect, and with reference to the Pacific National of Boston, the directors are said to have had full information of the irregular and illegal methods which led to its ruin. The Comptroller recommends an amendment to the law, making it a criminal offense for an officer of a bank to make loans clandestinely, by the use of certificates, as in this latter case, or otherwise. It is well that our business men, merchants and others who act as directors in our fiduciary institutions, should fully comprehend the duties which they assume. Their names cannot be used merely as ornamental appendages, to attract depositors and bolster credits.

## Railways in Mexico.

The information laid before the Government of Mexico on the 16th of September, shows that the work of building railways is being vigorously pushed in many parts of the country. When the various schemes are completed and communication is thoroughly established between the different centers of importance, the benefit resulting to Mexico will, no doubt, be considerable. We may also look for some advantages to be experienced by other countries from the development of this rich and fertile land. There is room for doubt, however, whether the capitalists who embark their money in these roads will speedily reap a corresponding amount of benefit. From the City of Mexico lines are being constructed in three or four different directions—to the North to Queretaro, to the West to Toluca, and thence to Morelia, while 137 kilometers (about 85 miles) have been completed from the capital to Cuautla. In the extreme North, operations have been commenced at Paso del Norte, and in the South we find considerable progress is being made upon the Tehuantepec Railway. At Guaymas, on the Gulf of California, 80 kilometers (about 50 miles) of line are finished in connection with the Sonora Railway, while at Merida, Vera Cruz, Puebla, and other parts of the country, the work of construction appears to have been energetically prosecuted. In addition to these lines and in accordance with a law passed in May last, the Government has granted sixteen concessions for new railways. This development will do great things for Mexico, without doubt, and unless her natural resources have been overestimated, she should soon attain a position of great financial strength. Almost all that is against her at this time is the character of her population, and her climate, which is evidently unfavorable to the development of an enterprising and industrious race.

Judge McKennan, of Pennsylvania, has rendered a decision in a bankruptcy case which is of considerable interest to New York business men. It was rendered in the case of De Forest Weld, assignee, against a number of creditors. The plaintiff proved, among other things, that in February last De Forest Weld was the owner of several large storehouses in Jamestown, N. Y., and in Meadville and Titusville, Pa., the property being valued at nearly \$200,000. In the early part of the afternoon of March 1, Mr. Weld made a general assignment for the benefit of his creditors, which assignment was made in New York State and was there recorded on the 2d of March. The assignment was also recorded in Crawford County, Pa., but not until the 18th of the same month. The plaintiff claimed that the assignment was valid to place the property out of the control of the assignor and beyond the reach of creditors when or at the moment the assignment was properly executed and delivered. Judge McKennan held that notwithstanding the act of the Assembly of New York required an assignment to be recorded, it was the proper execution and delivery of an assignment that possesses title; and further, in view of the fact that there had been no explicit and unmistakable ruling in the highest court of that State, or no statutory provision clearly stating that the recording of an assignment was necessary to vest title, he declined to rule as requested by the defendants, and thereupon refused to grant the motion for compulsory nonsuit.

We are about to witness the disappearance—if this form of words is admissible—of the last vestiges of the Centennial Exhibition. As we supposed, the scheme of a



permanent exhibition in the Main Building ended in failure, and now the structures still standing are to be taken away. The projectors of the 1883 Exhibition in New York—which, by the way, seems to have wholly fallen through—made a grand mistake in not buying this building. It could have been purchased, taken down, transported and set up again for a very small part of its original cost, and within the time at the command of the Commission. Where it was set up would have made less difference to the public than it seems to have made to the members of the Commission. Coney Island would have been an excellent site, meeting all requirements—except, possibly, those of land speculators interested in having it elsewhere. But it is idle to waste regrets for a mistake which cannot now be rectified. All the same, we do not think our business men and public spirited citizens did themselves any credit in allowing this undertaking to end in failure, leaving it to some other and more enterprising city to capture the next great exhibition.

The prosperous condition of our manufacturing industries is shown by the fact that during the past few months sundry lots of foreign machinery have been imported for use in this country. These importations include nearly all classes of machines for working metals, textiles, woods, &c., but especially such as are employed in the preparation of food products, such as chocolate, sausages, &c. The reason for this importation is not because such machines are not made in this country, but because orders for such as are needed cannot be filled by our machine shops within reasonable time. The machinery of the country is now driven to the breaking point, including the machine tools used in making other machines, and production cannot be increased, for the reason that the machine builders cannot build or buy the machines needed to enlarge the capacity of their own shops. There is also a scarcity of labor, and skilled machinists are in great demand. Under such conditions it is natural that those who want machinery at once should go abroad for it if they can.

Outside of telegraphy, Mr. Edison seems to belong to the class of people who are always about to accomplish something wonderful. It is stated that President Villard, of the Northern Pacific, has made a contract with him to build fifty miles of railroad in Minnesota, on which he is to try the efficiency of his electrical engines for hauling trains. Judging from the results which have lately followed promises made in behalf of Mr. Edison, we are not disposed to be sanguine of the success of this venture as his backers appear to be. He is an honest, industrious and most ingenious person, but he seems to lack the faculty of concentrating his efforts.

English papers express much satisfaction at the reported receipt of tenders from the United States for 27,000 tons of steel rails for new roads now building in the Southwest, and intimate that "a slight advance in price may be looked for, if it can be brought about concurrently in the two countries." If the American mills were out of the way, we should see something more than a slight advance, and it would not depend upon concurrence either. Indeed, it is interesting to speculate whether a reduction in the duty on steel rails would benefit the consumers any, or whether under the circumstances foreign makers would not demand and receive the full benefit of it.

Another coal vessel on fire and abandoned is reported, making the fourth or fifth disaster of this kind announced within three months. How many more have burned at sea without being heard from we do not know. The losses reported are mostly of ships cleared from Hull, England, showing the need of extraordinary precautions in carrying bituminous coal from deep mines.

Our Washington correspondent assures us that Judge Kelley will have the chairmanship of the Ways and Means Committee. We are glad of this for many reasons, for while we cannot agree with all the views held and expressed by Judge Kelley with regard to finance and internal revenue, we have the utmost confidence in his honesty and fidelity to the interests of the producing classes.

**The Consumption of Copper.**—The *Ontonagon Miner* says: The consumption of copper is increasing at a rapid rate, far more so than most people are aware of. Large amounts are required in the manufacture of machinery, so much in demand by the rapid growth of the West and the impetus given to railroad building; also for the manufacture of cartridges, as breech-loading firearms are fast superseding the old muzzle-loaders. A new demand has sprung up in the plan being adopted by nearly all large cities, requiring all telegraph wires to be laid under ground. This requires the use of copper wire or copper-covered wire, and hence manufacturers have large orders to fill. One eastern factory is now using over 12,000 lbs. per week or 6,000,000 lbs. yearly, an amount almost equal to the yearly product of the Quincy and Franklin mines. This demand for copper wire will increase rapidly as other cities see the necessity and benefits derived from the plan of putting the telegraph wires under ground, so that we may naturally expect a very large increase in the demand and consumption of copper.

## WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., Dec. 14, 1881.

The friends of Mr. Dunnell, of Minnesota, on the strength of his having received three votes out of one hundred and forty-seven for Speaker, and on the additional claim that he was formerly a member of the Committee on Ways and Means, have been making a desperate push for his appointment to the chairmanship of that committee. The movement is just enough to keep up an excitement and stir, but it is not thought by any one that Mr. Dunnell's ambition will be gratified in this direction, as it is universally conceded that Judge Kelley is entitled to the place by experience and peculiar fitness. Pennsylvanians who have made inquiry on the subject have received fresh assurances from the Speaker's friends that Judge Kelley will receive that chairmanship beyond a doubt. There is a great deal of scrambling after chairmanships among the upper strata of Republican Congressmen, but nothing could be more certain at the present writing than the appointment of Judge Kelley as Chairman of the Committee on Ways and Means, Mr. Dunnell and his friends to the contrary notwithstanding. There is little doubt also of the appointment of Mr. Hiscock as Chairman of Appropriations. The Speaker is anxious to announce all the committees before the Christmas recess, but is still in doubt whether he can accomplish it.

The tariff question has taken an early start in the Senate, and a full and free ventilation of that subject may be expected periodically from this time forth until the session terminates. The speech of Senator Morrill, of Vermont, was regarded as an able statement of the whole case, and has already furnished the Democrats with a supply of excellent texts. Senator Garland, of Arkansas, took the middle ground that neither protection nor free trade had any place in this country, and then argued that the tendency of protection was to build monopolies, which, in his judgment, were working great oppression. He favored reviewing the tariff, but did not believe in doing it outside of Congress. Senator Beck, of Kentucky, an irascible Scot, also took a turn at the crank, and with his usual vigor assailed the views of the Senator from Vermont, and pronounced himself in favor of tariff for revenue and nothing more. The fact is already apparent that the question of the tariff will not be disposed of in the Senate without a long and tedious debate. The Republicans are a unit on the question favoring the fostering of American manufactures by judicious protection against the pauper labor of England. The Democrats are wholly broken up on the subject, and there is every reason to believe that they will not readily come to an agreement.

Secretary of the Treasury Folger was introduced to the complications of the tariff and its interpretation, at a hearing a few days ago on an appraiser's assessment of 2½ cents per pound on an invoice of a certain class of steel blooms. Strange to say, ex-Representative Daniel J. Morrill was on the side of the lower rate. In his previous visits here he invariably took the side of high duties, and therefore rather surprised the older Treasury officials who were present. The difference between the higher and lower rates was shown to be as \$50 to \$13.50. The question came up on an assessment of 2½ cents per pound on a lot of 2800 steel blooms for rails for Carnegie Brothers & Co. The claim of Mr. Morrill was that a mistake had been made in assessing railway blooms as steel wire blooms required to pay a specific rate. It was shown that the specific duty applied to blooms under 600 pounds, and that the parties named had a contract for 20,000 tons weighing 550 pounds, and therefore the assessment was excessive and prohibitory. The revenues arising from these importations was from six to seven million dollars per annum. Prior to the decision of the department in 1879 fixing ad valorem duty, Mr. Morrill had done all he could to have it made specific, but under the decision he found it his interest to import. J. Park, Jr., and J. D. Weeks argued in support of the assessment, and Morrill, Collins and Counsel Beaman in favor of an ad valorem rate. Nothing can be done, says the Secretary of the Treasury, until an Attorney-General shall have been appointed.

The preliminary report of Prof. Raphael Pumpelly, on the production of iron ore in the United States during the census year ending June 1, 1880, has just been issued, and presents some interesting facts connected with the progress of this important industry during the last decade. It is shown that while the maximum yearly capacity of the 805 establishments reporting was 13,462,917 tons, the product for the year named was 7,971,706 tons, valued at \$23,167,907. The wages paid were \$9,538,117; the total number of miners, 17,923, and laborers, 12,492. The value of machinery was \$3,211,558; amount of working capital, \$4,850,763; value of plant, \$8,657,375; value of real estate, \$48,274,149. Of the aggregate product, royalties amounting to \$981,170 were paid on 2,266,510 tons. During the census year there were 439,451 tons of ore imported. The product of the largest mine was that of the Cornwall ore bank in Lebanon County, Pennsylvania. The average product per mine was 8772 tons; average yearly income per man, \$308.94; per cent. of year employed in mining, 77.55; average price per ton at mine, \$2.90; average cost of mining, \$1.35; per cent. ratio of value of yearly product to total capital, 33.13. The changes in the iron-ore mining industry in the United States during the past decade were:

	Per cent.
Gain in tonnage of total product.....	135.00
Gain in value of total product.....	75.45
Loss in value per ton of product.....	25.45
Gain in total capital.....	247.01
Gain in amount paid as wages.....	30.48
Gain in total number of employees.....	110.81
Gain in number of establishments.....	91.67

The average royalty paid was 42 cents per ton. The average price per ton has fallen from \$3.89 to \$2.90. Taking the price of gold in 1870, the true fall is but 14 cents a ton. Since 1870, owing to the demand for ores suitable for the manufacture of Bessemer steel, the prices have changed. In

Michigan they have fallen 15 per cent.; in Missouri they have risen 56.32 per cent.; in New Jersey fallen 30, in New York 29 and in Pennsylvania 35 per cent.

The following shows the order of production, in tons:

Pennsylvania.....	1,185,675	West Virginia.....	61,216
Michigan.....	1,844,712	Wisconsin.....	41,440
New York.....	1,302,127	Connecticut.....	35,018
New Jersey.....	757,373	Oregon.....	6,072
Ohio.....	547,393	Maine.....	6,000
Missouri.....	480,137	Texas.....	8,500
Alabama.....	101,676	North Carolina.....	3,318
Virginia.....	183,326	Delaware.....	2,726
Maryland.....	139,668	Vermont.....	560
Tennessee.....	104,461	Indiana.....	513
Georgia.....	94,416		
Kentucky.....	64,309	Total.....	7,971,706
Massachusetts.....	62,637		

Prof. Pumpelly, commenting upon this exhibit, says: "The six great iron States retain in 1880 their former relative rank, and Alabama, a new State, takes rank next to them. Pennsylvania and Michigan yield over one-half the entire product. Sixteen States were reported in 1870, against 23 in 1880. The new iron-producing States are Alabama, Georgia, West Virginia, Connecticut, Oregon, Maine and Texas. Virginia has gained four places; Maryland and Tennessee have lost two, Massachusetts four and Kentucky one." The counties producing over 100,000 tons per annum were:

Counties.	Tons.
Marquette, Mich.....	1,374,373
Essex, N. Y.....	620,944
Morris, N. J.....	568,420
Menominee, Mich.....	459,000
Lehigh, Pa.....	321,322
Lebanon, Pa.....	285,609
Berks, Pa.....	252,040
Blair, Pa.....	154,914
St. Francis, Mo.....	144,265
Northampton, Pa.....	128,859
	104,768

Total of 11 counties, first class..... 4,423,793 or 55.49 per cent. of the entire tonnage. Menominee County, Mich., did not produce ore in 1870; 174 mines were opened during the census year, producing 21.6 per cent. of total product.

## The Tariff Convention Resolutions.

We have no occasion to apologize to our readers for our tardiness in printing the resolutions adopted by the National Tariff Convention which met in New York last month. We made every reasonable effort to secure them, but the chairman of the Committee on Resolutions refused to let us have them, and the stenographer took his notes and papers to Philadelphia immediately after the meeting. We now have them, as follows:

**Resolved,** That, in order to prepare for such an intelligent revision of the tariff laws as will give full and harmonious effect to the protection policy, Congress is asked to pass a law authorizing the appointment of a civilian commission, with power to investigate fully the cost of labor, manner of living and efficiency of the labor in this country and elsewhere, and the inter-relations, condition and needs of our industries, and to report the testimony, with recommendation of such Congressional action as they may deem beneficial, and that, pending this investigation, disturbing and destructive assaults upon protective duties or special industries shall not be permitted.

**Resolved,** That the recent practice of overturning protective duties and bringing the whole system of tariff legislation into confusion, by means of Treasury decisions in customs cases, is a cancer eating into the vitals of our industries, to a number of which it has already proved fatal. Owing to those decisions, for which subordinate officers unknown to the people are really responsible, a late Secretary of the Treasury found some important provisions of the law involved in such a maze of absurdities that he felt himself powerless to do justice, and referred the matter to Congress for remedial legislation. The subject demands immediate action, no less for the protection of the revenues of the Government than for the protection of the industries of the people; and we ask for the prompt adoption of an amendment to the laws which will furnish a rule for the decision of cases of disputed classification in harmony with the spirit and purpose of our carefully devised protective system of tariff legislation.

**Resolved,** That the decline of American shipping engaged in the ocean carrying trade, which is injurious to the business of the country in peace and threatens its safety in war, should not be attributed to any lack of materials or skill in the building of ships, for they can be constructed as cheaply here as elsewhere, when the superiority of workmanship is taken into account. The blame rests solely with the Government, which, disregarding the teachings of our earlier history and the example of other maritime powers, not merely treats this great interest of the country with neglect, but even discriminates against it.

**Resolved,** That the tax upon banking capital and circulation, on bank checks and on matches and proprietary articles, are impediments to commerce, a duplication in some instances of burdens upon objects taxed under State laws or petty exactions, which annoy and cost the people more than they benefit the revenue.

On motion of Mr. Elder, of Pennsylvania, the following committee was appointed for the purpose of presenting the action of the convention to Congress: The Hon. Daniel J. Morrill, of Pennsylvania; John Roach, of New York; J. B. Grinnell, of Iowa; the Hon. R. W. Thompson, of Indiana; the Hon. Columbus Delano, of Ohio; Henry Bower, of Philadelphia, Pa.; the Hon. Rufus B. Bullock, of Georgia; C. H. Cramp, of Pennsylvania; Wellington Smith, of Lee, Mass.; Thomas H. Wells, of Youngstown, Ohio; Charles Ridgely, of Illinois; F. W. Nickerson, of Boston, Mass.; Harris Lewis, Hickman, N. Y.; J. C. Stevens, Ohio; A. H. Jones, Pennsylvania; F. J. Kingsbury, Connecticut; J. J. Hagerman, Wisconsin; James Park, Jr., Pennsylvania; Willard Warner, Alabama; A. J. Littlefield, Rhode Island; A. F. Spier, New York; Ezra Rush, Michigan; John Jarrett, of Pennsylvania; William E. Gellatly, of New York; John F. Henry, of New York, and William Rogers, of Maine. A resolution was adopted recommending the abolishment of the internal revenue taxes on bank checks, proprietary articles and medicines.

The following resolutions were presented

by John W. Hinton, of Milwaukee, and approved by the Convention:

**Whereas,** Labor is the creator of capital, the sole parent of all prosperity, the only source of a nation's wealth and progress, and

**Whereas,** No people can be truly independent without industries and manufactures, that can clothe and furnish them with all the necessities of life during peace, and provide the means of defense in case of war; and

**Whereas,** Under a government like ours, where all labor is acknowledged as respectable, all workingmen are the political equals of and endowed with the same political rights as all others; therefore, it is

**Resolved,** By the National Convention, now assembled in New York City, that the chief aim and purpose of a tariff on all foreign-made fabrics, and all raw materials not produced or existing in this country, is for the protection of American labor, and to enable our manufacturers, through a tariff, to pay higher wages to American workingmen than they would be able to do were they forced to compete with unprotected foreign workingmen, where labor is pauperized, and where laborers have not the civil, religious or political rights that our workingmen enjoy.

**Resolved,** That while we are in favor of a wise, just and equitable revision of the existing tariff by a commission selected of experts or manufacturers, we are utterly opposed to any free-trade tariff that would build up foreign trade on the degradation of the workingmen of our own country.

**Resolved,** That the protection of our labor in preference to the labor of any other country is the cardinal point of every sound protectionist, and is now, as it was in 1789, the first and chief duty of our Government.

## Hydraulic Riveting.

To the Editor of *The Iron Age*.—DEAR SIR: The interesting article upon the subject of "Set Riveting," contained in a recent issue of *The Iron Age*, has been read with pleasure. Comparison is therein made of the method of riveting by steam machinery, but the hydraulic system is quite ignored. I therefore presume to offer some observations upon a system of riveting which has been in vogue some years in this country, and to a limited extent in yours also. This is a subject of importance to all concerned in engineering establishments, more especially in these days of competition and trade combination, and every genuine improvement merits consideration. In so doing I shall confine my remarks to the system perfected by Messrs. Anderson & Gallwey, a rising firm of engineers devoting their attention principally to hydraulics. Although a young firm, their experience is probably as extensive as that of any authority in the line, dating as it does from the very inauguration of the hydraulic system of riveting, punching and shearing. In the first place I shall set out some of the advantages attending the use of Anderson & Gallwey's improved hydraulic riveting machinery, with a slight notice of the plant, and then give some figures showing the saving effected by its adoption.

The first advantage is one gained over steam-riveting machinery by the avoidance of almost all foundations, and by the economical method in which the power is applied, as compared with the heavy masonry and costly expenditure of fuel necessitated by steam riveters. In the second place, the force brought to bear upon the rivet combines the effect of a blow and prolonged pressure, with the power of retaining the pressure until the rivet becomes cold—an important consideration when thick plates are being worked. Thirdly, the stroke of the riveting die adjusts itself to inequalities in the length of the rivet, so that when the rivet is too long no fracture can result; on the other hand, an equally tight joint is made should the rivet be too short; the holes, likewise, no matter how irregular, are always completely filled. Fourthly, the dies do not require altering with varying thicknesses of plates, and owing to the manner in which the pressure is applied, cast-iron manholes, blocks and the like, can be riveted on—the latter is a valuable feature in these machines. Fifthly, these improved hydraulic machines can close from 12 to 20 boiler rivets per minute, as compared with 30 per hour attained by hand, and 30 to 60 per hour by steam, according to your report upon work done in the United States. In girder and similar work a still greater speed can be obtained. Sixthly, very little skilled labor is required to manipulate the riveters. Usually boys do the principal part of the work, especially where it is plain and straightforward; men are only required for the heavier portions. Lastly may be named the fact of perfect silence in working, complete freedom from vibration, economy in working expenses, owing to the acknowledged small amount of wear and tear of the machines. There is, besides, the facility of applying the reserve of power contained in Anderson & Gallwey's improved accumulators to working their punching and shearing machines, bending and flanging presses, and other hydraulic labor-saving tools. As regards the amount of power to be obtained from this system, as much as 60 tons pressure can be exerted upon the rivet-head; 40 tons, however, suffices to work up to 1½-inch rivets in 1½-inch plates, provided the accumulators are properly proportioned.

The pumps used in this plant work up to 1500 pounds per square inch, and are of the most solid design and construction. Differential and box type accumulators are employed. The special features of the former result in giving a sharp blow and prolonged squeeze to the rivet, at the same time allowing the pressure upon the rivet-head to be varied from 10 to 60 tons. The latter type does not give such a decided blow, yet excellent results are obtained therefrom when it is employed for light boilers, girders and shipwork. This type is also well adapted for working the other hydraulic machine tools mentioned above. The riveters themselves are of various types, fixed and portable, according to the class of work to be operated upon. Several riveters can be supplied by one set of pumps and accumulators.

The portable machines can be swung from a crane so as to reach work otherwise difficult of access; thus the riveters are taken to the work, not the work to the machines.

The cost of working will best be illustrated by comparison of the prices paid in this country for hand riveting with the cost of riveting by this system, which shows at a glance an immense saving. Thus 116 ¾-inch diameter rivets in foundation rings of locomotives, 3-8ths of an inch in thickness, can be closed in about 15 minutes for 2½, which cost by hand 23/9. Fire-hole door rings, costing 12/6 to hand rivet, are done for 3/ by machine. Marine boilers of 1 foot 8 inch plates cost 28/ to 35/ per 100 rivets by hand, as against 3/6 by hydraulic machine. Land boiler shells are riveted for about 1/6 per 100 rivets. The work that one gang of men will do on the front of a 7-foot-diameter Lancashire boiler in nine hours, a portable hydraulic riveter will get through in one hour. A portable riveter employed upon wagon frames and shoes, will close 1000 rivets per day with one boy at 6/ and two boys at 12/ per week, or about 6d. per 100 rivets. In shipbuilding, an average of 1500 rivets can be driven per day, at a cost of 3/ per 100, or about one-third the outlay for hand labor. Against these economies must be placed interest on invested capital; but that is written off entirely in a short space of time, for one firm, turning out on an average one boiler per week, saved the entire cost of their plant with interest in two years. A small machine paid for itself, a 120 days, fully proving the economy and advantage of Messrs. Anderson & Gallwey's improved system of hydraulic riveting. The saving in time is more important than may at first sight be imagined, for it stands to reason that a large amount of work can be turned out with limited shop room and a small number of hands.

In conclusion, I would mention that this firm's last improvement is a machine to rivet on the safety valve seatings of boilers, a feat hitherto unaccomplished, although frequently attempted during the past six years. One of these machines is now successfully working in the shops of the L. & N. W. Railway at Crewe. Upon some future occasion I will, with your permission, furnish more detailed information, with illustrations, of this plant.

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## The Bestwood Iron Works.

The opening of the blast furnaces in connection with the Bestwood Coal and Iron Works, recently took place under most favorable circumstances. As the dimensions of these works in particular, and the importance of the district command more than ordinary attention, it may not be uninteresting to give a few facts relative to the origin and history of the above-named company. The Bestwood estate, on which the company's colliery and iron works stand, consists of about 3000 acres, which is the property of the Duke of St. Albans, and forms a complete parish in itself. The company have succeeded in effecting a long lease of the entire estate underground, and they commenced their operations by the sinking of a colliery in 1873. Though many wise-aces had expressed doubtful opinions in reference to the value of the minerals beneath the surface, the directors, with commendable energy, prosecuted their labors and eventually found what is called top hard, at a depth of about 420 yards. This result was realized after a couple of years of hard labor. To the delight of all concerned the coal was found in a thick seam and in a high state of perfection. Thus encouraged, the promoters went to work in effecting the completion of the colliery, the upshot being that two large shafts, fitted with most powerful machinery, were built. The prosecution of the work of developing the mine gave evidence that the extent and quality of the coal would be quite equal to the most sanguine expectations of the promoters. The seam occurs at the top of household coal, known as brights; next comes the hard coal, which is brought into requisition for steam purposes and iron smelting; and the next portion is the canal coal, which is distinguished for its special illuminating power when converted into gas. So successful have the works been that at the present time the colliery is capable of raising about 500,000 tons per year, and the iron works have been projected and carried out with a view of consuming a portion of the hard coal of this seam. It may be mentioned that Bestwood is adjacent to the thriving populations of Nottingham, Derby and Leicester, which boast an aggregate population of nearly 400,000 people. The works are also in close proximity to the famous colliery ironstones of Northampton, North Leicestershire and South Lincolnshire; in fact, they are the nearest works to these ironstone fields. As some evidence of the importance of the estate and the works thereon, it may be said that for some time past the three railway companies—the Midland, Great Northern, and London and North Western—have been engaged in a sharp rivalry for the acquisition of railway approach, and at the present time all three have found their way thither. By this means communication is easily obtained with all the commercial centers of the land. The iron works, which are regarded as of the best character in the country, have two large furnaces with patent stoves, together with a pair of powerful blowing engines of 100-inch diameter blowing cylinders each. Complete as all the appliances are to the minutest detail, the entire works are so constructed that they are capable of great enlargement at any time when circumstances render it necessary.

The St. Gothard Tunnel will be open for traffic by Jan. 1. The weak part under Andermatt, which has broken so often, is now thought to be permanently and securely protected against collapse. It is now proposed to connect the Adriatic with the Lago Maggiore by a system of canals, of which the termini will be at Venice and Magadino. This project presents neither financial nor engineering difficulties, and it will probably be actually accomplished.





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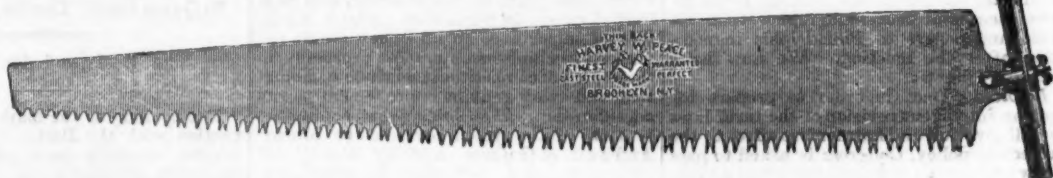
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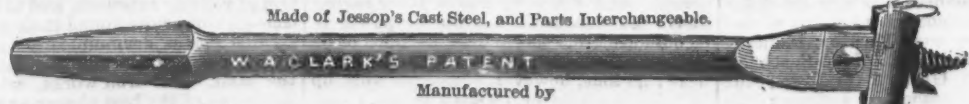
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WM. A. CLARK'S PATENT EXPANSIVE BITS WITH TWO CUTTERS EACH.

Small Bit Boring from ½ in. to 1½ in.; Large Bit Boring from ¾ in. to 3 in. Warranted.

Made of Jessop's Cast Steel, and Parts Interchangeable.



Manufactured by

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NEWTON'S PATENT STEAM TRAP AND GRATE BARS,

MANUFACTURED BY

PROVIDENCE STEAM TRAP CO., Providence, R. I.

See The Iron Age first issue of each month.

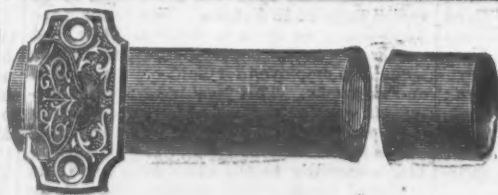
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## B. FITTS PATENT MAGNETIC METAL SEPARATOR,

Manufactured by

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88 Hermon St., WORCESTER, MASS.



IVES' PATENT

Burglar-Proof Door Bolts.

For sale by leading Hardware Jobber throughout the country.

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Sole Manufacturer and Patentee,

187 St. John Street,

NEW HAVEN, CONN., U. S. A.

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## BABBITT AND TYPE METALS,

Brass Castings and Solders of all Kinds.

PIG AND BAR TIN.

PIG AND BAR LEAD

Pig Brass and Copper, Spelter, Antimony, &amp;c.

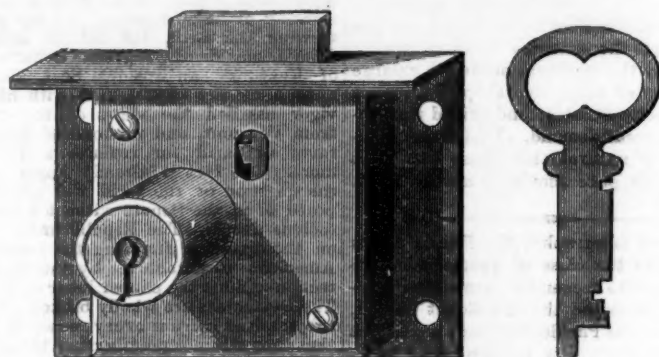
1615 &amp; 1617 Spring Garden Street,

PHILADELPHIA.

GEORGE HUNT,

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## TWO NEW LOCKS.



## THE EAGLE LOCK CO.,

TERRYVILLE, CONN.

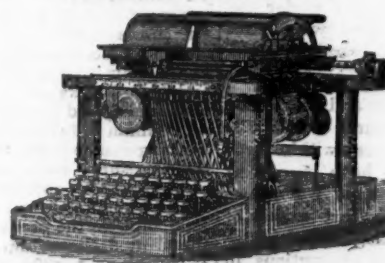
Have just added two new and valuable patent locks to their already large variety, which will at once commend themselves to the trade.

No. 6101 (Brass) and 6117 (Iron), represented by the above cut, may be locked without using the key, by simply pressing on the plate in the end of the tube. The other patent, Nos. 6201 and 6217, is a lock similar in appearance, but is so constructed that with a small screw driver any dealer can adjust the lock to an endless variety of keys, or make his whole stock "alike" to fit one key, without opening the lock or affecting its security.

These patents have been applied only to drawer and cupboard locks as yet, but will soon be produced in chest and wardrobe locks.

For Sale by Hardware Jobbers Throughout the Country.

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## TYPE WRITER

For the Heavy Correspondence of Business Houses.

Used and Recommended by Thousands of the Largest Houses in the Hardware and other Trades.

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Every Machine Guaranteed Satisfactory.

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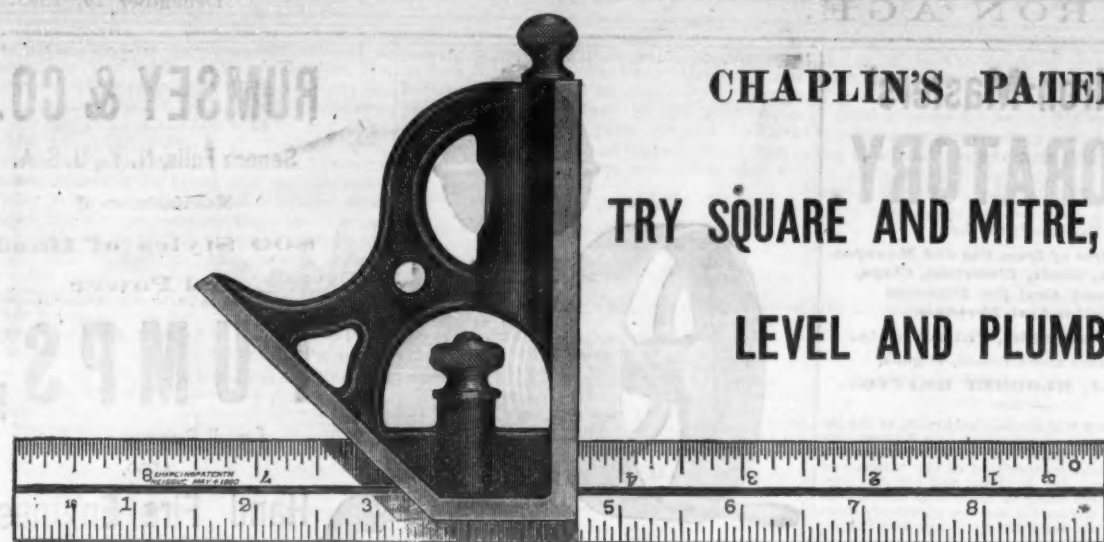
Lehigh Ave. and American St., Philadelphia.

Branch House:

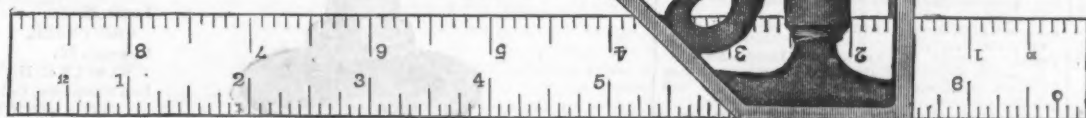
No. 198 Chambers St., New York

SPECIALTIES: Fluting Machines, Hand Fluters, Plating Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.





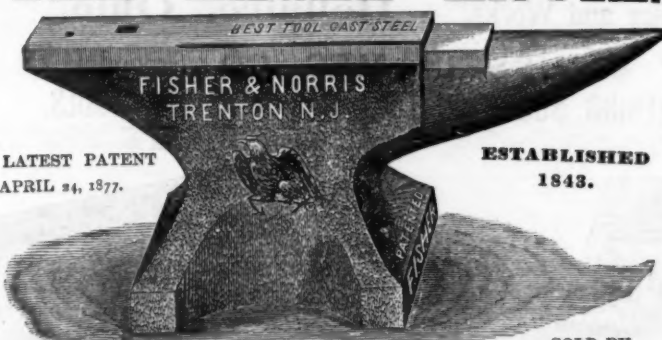
## CENTER SQUARE AND DRAUGHTSMAN'S T-SQUARE.



**STANDARD TOOL COMPANY,**  
ATHOL, MASS.,  
Sole Manufacturers and Owners of the Patent.

Circular, with Price List and Discounts, on Application.

## THE "EAGLE" ANVIL.



LATEST PATENT  
APRIL 24, 1877.

ESTABLISHED  
1843.

New York—RUSSELL & ERWIN MANUFACTURING COMPANY, DURRIE & McCARTY, TENNIS & WILSON.  
Philadelphia—JAMES O. HAND & CO. Boston—GEORGE H. GRAY & DANFORTH.  
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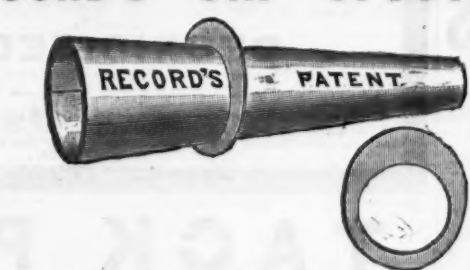
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Consists of two tapering tin tubes, the edges butting one against the other. One tube is forced inside the other, so that the joints come on opposite sides of the spout and are firmly held by a flange forced on about midway. It is then returned, which welds it into one solid tube. The rim is flange-shaped (which is shown separately in cut), widest on the upper side, thus requiring a smaller hole in the sap pail, therefore the nail cannot be dislodged or swing on cut. One cut shows the spout full size, and the other the manner of using.

DIRECTIONS.—Bore hole in tree with  $\frac{3}{8}$  in. bit, drive spout with wide side of flange up. Punch a  $\frac{3}{8}$  in. hole in tin sap bucket, and hang back of flange on spout, as shown in cut. For wood bucket, nail small ring on inside of bucket and hang on spout same as tin. To empty the sap tip bucket, as represented. This spout is not only one of the cheapest, but the strongest and best sap spouts made, and will last a lifetime, and the tree will yield the largest flow of sap. Net wholesale price, \$12.50 per 1000. Put up in paper boxes, 100 in each. Address orders to principal jobbers or to

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THE LEADING WRINGER OF AMERICA.

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THE

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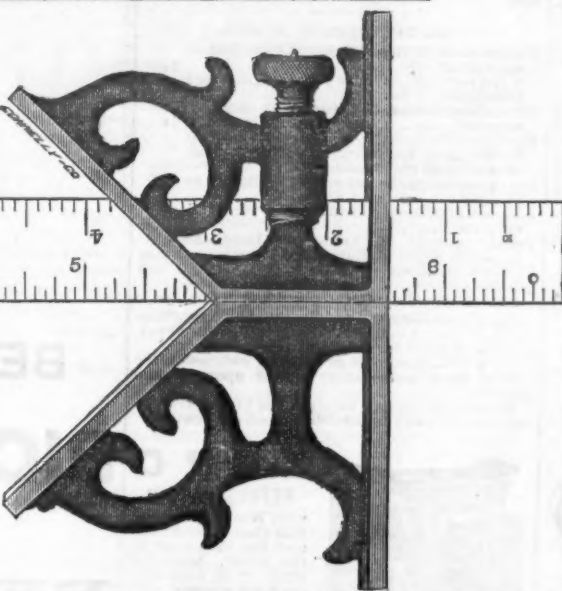
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LEVEL AND PLUMB.



## WARRANTED!!

Better than the Best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL. PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." It does not bounce the hammer back, and therefore can do more work with lighter hammer. Horn of tough untempered steel, never to break or bend. Only Anvil made in United States fully warranted as above. None genuine without our trade-mark.

N. B.—That the "Eagle" Anvil is the only one made at Trenton, New Jersey, and it must not be mistaken for an Anvil in the market called Trenton, but which is really of foreign manufacture, and an imported imitation of the English Anvil.

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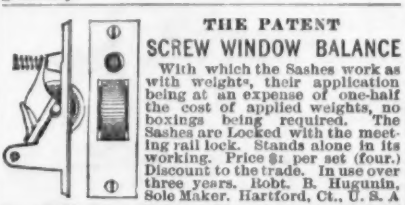
Unsurpassed for cheapness and durability. Unlike any other make, it combines a perfect lever principle with a blade working in a slotted steel hook.

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164 West Main St., Rochester, N. Y.

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HARTFORD, CONN., U. S. A.  
For sale by C. E. JENNINGS & CO., 26  
Chambers St., New York, and the trade  
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THE PATENT  
SCREW WINDOW BALANCE  
With which the Sashes work as with weights, their application being at an expense of one-half the cost of applied weights, no boxings being required. The Sashes are locked with the meeting rail lock. Stands alone in its working. Price \$1 per set (four). Discount to the trade. In use over three years. Robt. B. Huggins, Sole Maker, Hartford, Ct., U. S. A.

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Manufacturers of  
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Of Cotton, Linen & Steel.  
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Green Mountain,  
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Moving Machine,  
German Pattern,  
Chocolate, Ax Blits,  
Stones made, labeled and branded in any style desired. PRICE AND QUALITY GUARANTEED. All the above brands are of clear, keen grit and will not glaze.

## Gothics and Puddling Rolls.

Gothics were formerly employed to produce muck bars which would readily enter grooves for flats, squares and rounds of various shapes. Their areas varied from pass to pass by one-sixth to one-tenth for iron, and about one-eighth to one-twelfth for steel. Oval passes of a length equal to twice their height are frequently used, consecutively or alternating with diamond-shaped grooves, to avoid tearing the unbroken sharp edges which are formed by gothics on small billets of puddled steel.

At the present day polygons or box grooves are generally preferred, on account of giving increased vertical pressure, liberating the slag which flows readily from the open side walls. Gothics also compress the material and force out the slag in longitudinal lines, producing a rapid reduction of section and great elongation, but polygonal grooves produce greater density and uniformity of material throughout. Gothics having curved sides allow the material to travel and finally turn over, seeking that part of the groove which has the greatest velocity; the greater the ratio of width to height, the more readily will it turn, because there are no vertical guiding surfaces to hold the material in position. Originally gothics were designed for the use of billets coming directly from the squeezer or hammer, in order to take advantage of the heat, allowing considerable compression. Experience had shown that bars of considerable thickness were not sufficiently compressed, their fracture indicating the presence of slag in the material. This fact led to a call for thinner bars, reducing the area of muck bars, by rolling them, to one-tenth their original section, by which process dense material tolerably free from slag was obtained. At present  $\frac{3}{4}$  to  $\frac{1}{2}$ -inch bars are used, while formerly bars of 1 to  $1\frac{1}{4}$ -inch thickness were practicable. The original shape of gothics was probably a square whose diagonals were vertical and horizontal, but in order to reduce the enormous side pressure, and also to gather up the loose material from the puddle ball, a curved form was given to the sides, the circular arc being adopted as giving a figure easily reconstructed, all measurements used in reconstruction being fractional parts of the diameter of that circle. The depth of these grooves could now be diminished on account of increasing the width, which permitted the bar to be entered readily into the succeeding pass on being turned 90 degrees; the grooves were widened by turning easy curves at their lower edges. The side curves were made to depend upon the amount of spread-

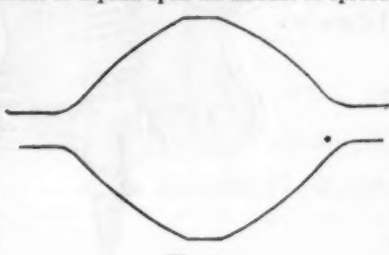


Fig. 1.

ing, as well as upon the quality of the puddled material to be worked, and were constructed according to previous practice, while the grooves were proportioned by each designer according to his notions and experience of the proper width for a certain height in any set of rolls. To facilitate the drawing the usual manner of proceeding was to give dimensions derived from experience, indicating the relative proportions of different passes according to an almost constant coefficient of pressure—one-eighth to one-ninth—and representing the sides of the gothics by straight lines, leaving their exact shape undetermined. Too great a number of grooves were usually crowded into the customary length of a set of rolls, thereby severely straining them. It should be mentioned here that the greater the ratio of width to height of a groove, the more easily will a bar skip. To avoid this difficulty and still use the greatest possible pressure, the height is reduced as above described. It was found by trial that a concave shape did not obviate skipping, and horizontal straight tops (as shown in Fig. 1) were finally adopted for the grooves. The area of a gothic for rolling flat bars was regarded as equal to a square, the sides of which were equal to the short diameter from curve to curve.

When designing a train the lengths of the rolls were first determined. The gothics were put in one set of rolls used, for roughing down iron or steel, and the flat grooves were all turned in a separate set of rolls of the exact length of the roughing rolls, so as to avoid shifting the housings when changing from one shape to another. The number of revolutions and the diameters of the rolls were then determined upon by practical considerations gathered from experience. It had been observed that rolls from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches in diameter should not make more than 66 revolutions, some kinds of puddled iron tearing even at that speed. Should, however, greater speed be required, it is better to increase the diameter of the rolls than to increase the number of revolutions. The correctness of these views is corroborated by the following references: 1. B. Valerius. Merchant iron train, by C. Hartmann; 30 to 40 revolutions per minute; diameter of rolls being from 16 to 19 inches.

2. Morin. Results of experience, by C. Holtzmann, Carlsruhe; 60 revolutions per minute.

3. Hollenberg. Designing of rolls, by Nicolai, Berlin, 1869; 40 to 60 revolutions per minute; diameter of rolls from 17 to 19 inches; length of rolls, 4 to 5 feet, the top roll being  $\frac{1}{8}$  to  $\frac{1}{4}$  of an inch larger within the grooves.

4. "Huette." Ernst & Korn, Berlin, 1870; 30 to 45 revolutions per minute; diameter being from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches; length of rolls about 49 inches, there being two sets of housings, each set requiring not less than 30 horse-power.

5. Ingenieur-Kalender. P. Stuehlen, Essen, 1877; 50 to 100 revolutions per minute; diameter of rolls,  $1\frac{3}{4}$  to  $1\frac{1}{2}$  inches; length of rolls,  $49\frac{1}{4}$  inches. They were

operated by a direct-acting steam engine, having a cylinder of  $10\frac{1}{4}$  inches diameter, for two sets of housings, and a diameter of  $23\frac{1}{4}$  inches for three sets, the length of stroke being  $23\frac{1}{4}$  inches.

6. Ingenieur-Kalender. Fehland Jules Springer, Berlin, 1881; 40 to 45 revolutions per minute for heavy rolls; 50 to 55 revolutions per minute for medium rolls; 60 to 77 revolutions per minute for wire rope billet rolls. The diameters of these rolls varied from 15 to  $21\frac{1}{4}$  inches, the lengths being equal to  $3\frac{1}{2}$  diameters, or about 56 to 65 inches, using two or three housings for 14 to 16 furnaces.

The first mills, designed according to apparently sound principles, had the merchant and roughing rolls, shears and drop-hammers all united by gearing, which system, although very economical, had to be abandoned and replaced by another, on account of the frequent breaking of the gear wheels. Independent engines were adopted for each separate train, provided with bottom plates for three sets of housings, so as to allow an increase of capacity of the mill in case of sudden demand. These engines were generally of the vertical direct-acting type, and rested on columns so that the cylinders could be replaced by larger ones should an increase of power and speed be required. The finishing rolls and hot-bed were placed nearest to the engine; then came the roughing rolls, which, when in conjunction with another train, would work at both sides of it.

Any one who has performed the task of reconstructing an old low rolling mill, well remembers redesigning the rolls so as not to have gothic and flat grooves side by side, making each train entirely independent, in order to avoid delay in rolling all the heated blooms, or burning those which had to remain in the furnace until all other material had been worked off. In case the furnaces heated all the blooms at the same time, the material could not be rolled in the same period, and the consequence was that some of it would cool to such an extent as to require reheating, causing a loss of weight.

A certain German mill, having 65 puddling furnaces, had 3 mill-bar trains, one of which had 2 sets of rolls (one roughing and one finishing); another had 2 independent rolls, and the third had 3 sets of rolls. For all these, 2 independent roll trains were substituted, and after reducing the variety of shapes to 3 sizes, 5 pairs of rolls were sufficient to do the same amount of work which formerly kept 7 sets busy, or, rather, idle. The large number of spare rolls of different diameters and various lengths which had to be kept on hand so as to have them ready for use in case of an accident, represented a considerable amount of idle capital which might have been profitably employed elsewhere. According to the new plan only 2 sets of spare rolls were required, thus removing this objectionable point. Another German mill adhering to the same principle, running 26 furnaces, had 3-high rolls, the top and bottom rolls being the same in each set, and consequently interchangeable. When the gothics are very wide and the pressure is great, the last grooves are apt to bend the ends of the comparatively cold bars, which when striking the floor imperil the roller. Reversibility of rolls is of great advantage in plate trains making 20 to 30 revolutions per minute. Blooming mills ought always to be reversible, on account of the heavy weight of the pieces to be handled, the same being true for rail mills; puddling trains when running not faster than 70 revolutions per minute might be similarly designed. Korpely gives in his report on *Fortschritt im Eisenhuettenwesen*, 1870, the following interesting and valuable data:

Owner and Manufacturer.	Dia. steam cyl. in inches.	Stroke in inches.	Ratio of gearing.	Dia. of rolls in inches.	Minim. steam pressure in pounds.	Adapting No. of power.
Crews-Thwaites & Carbott, Bradford.	28	48	1.3	24	50	1.00
Siemens-Landore.	30	48	1.3	24	45	1.18
Siemens-Landore.	34	48	1.3	24	45	0.9
J. Brown, Sheffield.	34	48	1.3	24	50	1.46
West Cumberland Co., Workington.	36	48	1.3	24	60	1.06
Steel Union.	36	48	1.3	24	56	1.33
Dortmund Union, Hamm Machine Constr. Society.	36	54	1.1	24	50	.....
Steelwork Osnabrueck-Dilman, Prince Rudolph H.	36	54	1.2	27	35	.....

FOR IRON.

Dowling.	36	48	1.4	35	50	1.00
Ebbw Vale.	30	48	1.2	30	50	1.03
Bochum-Thwaites & Carbott.	34	48	1.4	32	50	1.00
Steel Union.	36	60	1.2	30	56	0.99

FOR PLATES.

Crews-Thwaites & Carbott.	28	48	1.3	24	50	1.00
Bolton-Thwaites & Carbott.	30	36	1.4	28	60	1.18
Schultz, Knauth & Co., Essen Union.	36	34	1.3	27	30	1.54
Borsigwerk, Upper Silesia.	42	30	1.3	28	25	0.86
Coqueril, Seraing.	35	30	1.3	28	25	1.05
Bergen Witten.	36	30	1.3	28	25	.....
Neustadt a. Ruheberg, Hamm Mach. Construction Soc.	36	34	1.2	32	30	1.20
Dillinger.	38	30	1.3	28	35	.....
Phoenix Eschweiler.	36	60	1.3	28	50	1.05
Burbacher Huette-Coqueril, Seraing.	30	47	1.2	32	.....	.....
Gute-Hoffnung, Huette-Jac. Haniel and Huggen.	40	48	1.6	26	30	.....

It is urged by some that the 3-high rolls heap up the slag in the middle of the bars, ruining the material and making it unfit for wire rods; this is, however, flatly denied by numbers of iron men who employ this very method. To avoid the necessity of straightening muck bars after having been rolled, the rolls are so placed that the lowest groove is on a level with the floor, and the bar, led by side guards, falls on this floor and is straightened by its own weight. Delay is avoided by allowing the puddled bloom to enter the first groove when the muck bar leaves the train. The middle roll is generally the driven one. When such a train is once regulated it requires little, if any, adjustment of any kind as long as the grooves are correct. The pressure screws need not be touched and the water supply is carefully



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For each additional constituent of usual occurrence..... 1.50  
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For each additional constituent of usual occurrence..... 6.00  
For the per cent. of Carbonate of Lime, and insoluble Silicious Matter in a Limestone..... 10.00  
For each additional constituent..... 2.00  
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Very truly,  
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regulated, so that the requisite amount of water is delivered. The roller on the catcher side works with tongs, not requiring any hook suspended by chains; the fore-roller also catches the bar without any help, while revolving rollers in the feeding table, driven by belts, lead the bar to the next groove between the lower and middle rolls. These rollers are placed close together, with just enough space between them to allow the slag and scales to fall through. Rails for cars, laid around the mill, would afford greater facility for unloading directly from the cars, and do away with the ordinary, more expensive method of transporting the masses of iron. This at the same time obviates the necessity of carrying a large stock of fuel, which, if soft coal or lignite is used, rapidly deteriorates as a heating material upon exposure. Those gothics which are almost as wide as they are high, or, in other words, which are almost square, are especially adapted for rounds. Such grooves are to be selected for any particular shape, which reduce the blooms to the smallest desired section in as few passes as possible, at the same time compressing the material considerably toward the center of the bar. Due regard must be had as to whether the selected grooves will do the required work expeditiously, without causing skipping, without producing fins, and avoiding such sharp edges as to press them between the rolls or collars. The larger curves of these gothics are generally struck with a radius equal to their width, making width and height in the proportion of 12 to 10, with a reduction in size of one-eighth to one-tenth from pass to pass, these values being most generally adopted in designing rolls. In laying out grooves, having a given shape to work from, the last or finishing groove is taken as a basis (the width of finishing groove being equal to the bar plus shrinkage). If we take the case of 4, 3 and 2-inch bars, adding 1-64th of the width of the bar for shrinkage for each succeeding pass, then we will have

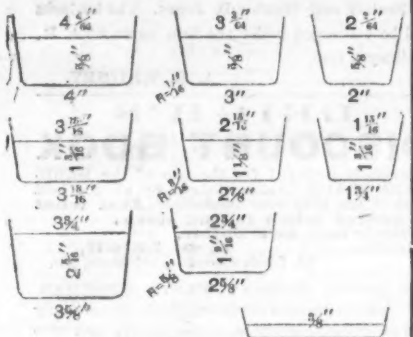


Fig. 2.

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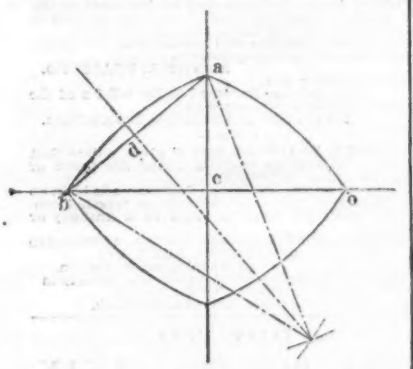


Fig. 3.

the following width of grooves for 1 inch height (given in Fig. 2).

These grooves are wider at the top than at the bottom, in order to allow the material to leave them easily, and have the lower corners nicely rounded to prevent fractures; sharp edges are quickly destroyed in the reheating furnace, while round ones do not offer as much resistance to the flames, and consequently last longer. All shapes produced in perfectly new grooves are scant, but as the rolls grow older and become worn correct shapes are rolled, and finally these become fuller and fuller until the rolls must be replaced by new ones. To avoid returning, the grooves have the correct finished width of bar at the bottom, all spreading being allowed at the top, although it might be advantageous to make them 1-16th scant in the beginning.

Experience has shown that 3 and 4-inch bars may be rolled in three flat grooves, while for 2-inch bars but two are necessary to roll them down from squares. Below are given the corresponding dimensions:

Width.	Height.	Width.	Height.
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2
3 1/2	2 1/2	3 1/2	2 1/2

As a rule the width of the top of any groove is equal to the width at the bottom of the next one. The gothics must measure as a maximum, 3 1/2 inches, and 1 1/2 inches across the corners, considering the shape full, neglecting the fillets, and allowing more for shrinkage in those grooves which are not entirely filled by the billet. The diameters of the curves for the first groove are given by the size of the forged or squeezed ball, while for the last groove they are known from the groove adapted for the smallest billet or bar to be rolled. If we take, for instance, a bar having a diameter of 160 mm., with a corresponding section of 20,106 sq. mm., and wish to reduce it to a bar of 2463 sq. mm. section with a diameter of 56 mm., a reduction of 17,643 sq. mm. must be effected, which, if done in 8 gothics, will give us the following figures:

Area in sq. mm.	Diam. in mm.	Area in sq. mm.	Diam. in mm.
20,106	160	2,463	56
17,643	140	2,463	56
15,180	120	2,463	56
12,717	100	2,463	56
10,254	80	2,463	56
7,791	60	2,463	56
5,328	40	2,463	56
2,865	20	2,463	56
400	0	2,463	56

Then the shape is examined as to whether the length of the diagonal of the billet from

the third groove will answer for the first groove for a 4-inch flat row. Should it not be found so it would be necessary to change the pressure. Instead of 160 mm. as a diameter, we could take 158 mm. with a corresponding section of 19,606 square mm.; subtracting 2463 square mm. from this we obtain 17143.6 = 612.3, and the dimensions in the above table would become:

Area in sq. mm.	Diameter in mm.	Diameter in inches.
17,143.6	158	6 1/8
14,680.4	138	5 1/2
12,217.2	118	4 3/4
9,754.0	98	3 7/8
7,290.8	78	3 1/4
4,827.6	58	2 3/4
2,364.4	38	1 5/8
400	18	3/4

Formerly these figures were as follows:

Area in sq. mm.	Diameter in mm.	Diameter in inches.
20,106	160	6 1/4
17,643	140	5 1/2
15,180	120	4 3/4
12,717	100	3 7/8
10,254	80	3 1/4
7,791	60	2 3/4
5,328	40	1 5/8
2,865	20	3/4
400	0	0

The initial area being less than in the other case, indicated a greater amount of hammering before being rolled, and consequently the material entered the rolls rather cool, requiring frequent reheating and often causing the breaking of the rolls. By adopting a larger area for the first groove, the slow process of hammering was abbreviated, the welding was more perfect and the rolls could more easily reduce large sections, the material being hotter than in other cases.

A. Hollenberg, in his "Roll Construction," gives the ratio of height to width in Gothics as 1:1.2, and allows 1-12th inch

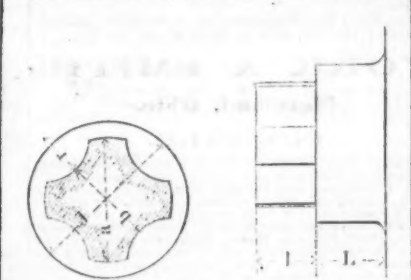


Fig. 4.

for spreading: thus the height and width of the first groove would be respectively 60 and 72 lines, assuming the height as 60. When grooves are constructed with curves having radii equal to the width, their contents may be easily determined in the following manner: In Fig. 3, take  $ac = .5h$ ,  $bc = .6h$ ,  $bo = 1.2h$ ; then  $ab =$

$\sqrt{0.25h^2 + 0.36h^2}$   
 $= .781h$ ,  $ad = \frac{1}{2}ab = .39h$ , and the triangle  $acb = a \times ch \times b = .15h^2$ ; but the segment  $= \frac{1}{2}ab \times h (1.2 - 1.1346)h^2 = .034h^2$ , and  $\frac{1}{4}$  of groove  $= .184h^2$ , the entire groove being  $.736h^2$ . Mr. R. Daelen recommends for the length of rolls, 3 to 3 1/2 diameters for sheet and merchant iron, but only 2 1/2 diameters for heavy work, the length and diameter of each journal to be one-half of the diameter of the rolls, except for sheet iron, in which case two-thirds of the diameter should be taken. The grooves ought not to be deeper than one-quarter of the roll diameters. Mr. Dickman found that the iron loses more heat in each pass than is developed by compression in the ratio of 34:35, and

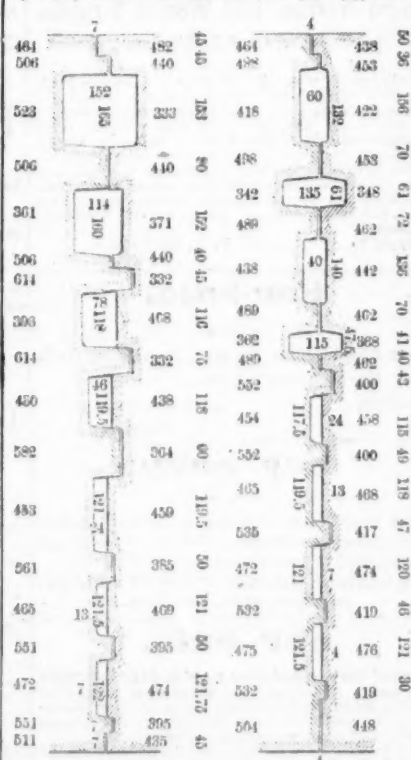


Fig. 5.

measured it by equal weights of water of equal temperatures. By adopting his system of reduction of the areas of the successive grooves, a reduction down to 10-14 of the section of the material may be effected without forcing any of it between the collars. Mr. P. Tunner recommends for the diameter of muck bar gothics 6", 5", 4", 3", 2", 1", 1/2", 1/4", 1/8", 1/16", 1/32", 1/64", 1/128", 1/256", 1/512", 1/1024", 1/2048", 1/4096", 1/8192", 1/16384", 1/32768", 1/65536", 1/131072", 1/262144", 1/524288", 1/1048576", 1/2097152", 1/4194304", 1/8388608", 1/16777216", 1/33554432", 1/67108864", 1/134217728", 1/268435456", 1/536870912", 1/1073741824", 1/2147483648", 1/4294967296", 1/8589934592", 1/17179869184", 1/34359738368", 1/68719476736", 1/137438953472", 1/274877906944", 1/549755813888", 1/1099511627776", 1/2199023255552", 1/4398046511104", 1/8796093022208", 1/17592186044416", 1/35184372088832", 1/70368744177664", 1/140737488355328", 1/281474976710656", 1/562949953421312", 1/1125899906842624", 1/2251799813685248", 1/4503599627370496", 1/9007199254740992", 1/18014398509481984", 1/36028797018963968", 1/72057594037927936", 1/144115188075855872", 1/288230376151711744", 1/576460752303423488", 1/1152921504606846976", 1/2305843009213693952", 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Foot Houston St., N. E., N. Y.

General Hardware, Specialties, Railroad and Machinery Supplies.

WANTED.—An engagement to travel for some manufacturing or wholesale Hardware house, to sell General or Heavy Hardware, Specialties, or Railroad and Machinery Supplies, by an ex-Hard-ware merchant, married, of good address, experience and habits. Can command trade in Ohio, Indiana, and Illinois. Best of references. Address  
**HARDWARE,**  
Office of *The Iron Age*, Builders' Ex., Cincinnati, O.

### For Sale.

One 18x30-in. Horizontal Engine. Two Locomotive Boilers, 80 and 75 H. P. each. One four-ton "Otis" Freight Elevator. One No. 5 Knowles Steam Pump, second-hand, but all in good order, complete, ready for immediate delivery. Will be sold low. For particulars address  
**BELCHER & BAGNALL,**  
40 Cortlandt St., N. Y.

### For Sale.

Stock of Hardware, Fixtures, and Good Will of the subscribers, in the city of Norwich, Conn.

Only one other hardware store. Population 21,000.

**FULLER & PARISH.**

### For Sale, to Close an Estate.

The property of Hon. H. D. Foster, deceased, consisting of about 200 acres of land at Harpersville, West Pennsylvania, R. R. (mouth of Deer Creek, on Allegheny River) 12 miles from Pittsburgh. Eligible for extensive manufacturing purposes, with railroad frontage both North and South of R. R. Station, giving an extent for parallel sidings of over one quarter of a mile. Proved to be all underlain by Hile's Station coal veins at a depth of about 100 feet below level of railroad. Will be divided to suit.  
**F. Y. CLOPPER, Administrator, Greensburg, Pa.**

SITUATION WANTED.—At once by a young man with 15 years' experience in the general Hardware trade. The best of references furnished. Address  
**E. L. Box 90,**  
Office of *The Iron Age*, 83 Reade St., New York.

### Special Notices.

## SECOND-HAND & NEW MACHINERY

December 15, 1881.

The following New and Improved Machinery Tools are part of what we have for early delivery:

6 1/2-in. swing, 12 ft. bed, Engine Lathes. December.  
1 1/2-in. swing, 13 1/2 ft. bed, Engine Lathes. December.  
1 1/2-in. swing, 15 ft. bed, Engine Lathes. December.  
1 1/2-in. swing, 18 ft. bed, Engine Lathes. December.  
1 1/2-in. swing, 20 ft. bed, Engine Lathes. December.  
1 1/2-in. swing, 22 ft. bed, Engine Lathes. December.

The following in store:

1 1/2-in. swing, 14 ft. bed, Engine Lathes. New.  
1 1/2-in. swing, 16 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 18 ft. bed, Engine Lathes. New.  
1 1/2-in. swing, 20 ft. bed, Engine Lathes. New.  
1 1/2-in. swing, 22 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 24 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 26 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 28 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 30 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 32 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 34 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 36 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 38 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 40 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 42 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 44 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 46 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 48 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 50 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 52 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 54 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 56 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 58 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 60 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 62 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 64 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 66 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 68 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 70 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 72 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 74 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 76 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 78 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 80 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 82 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 84 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 86 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 88 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 90 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 92 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 94 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 96 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 98 ft. bed, Engine Lathes. Second-hand.  
1 1/2-in. swing, 100 ft. bed, Engine Lathes. Second-hand.

Iron Planer, 57 in. wide, 25 ft. long, with two heads, 2d-hand.

37-in. x 35-in. x 9 ft. "Cove" Planer. Second-hand.

36-in. x 35-in. x 9 ft. Planer. New.

12-in. x 12-in. x 2 ft. Planer. Second-hand.

12-in. x 12-in. x 2 ft. Planer. New.

24-in. Radial Drill. New.

24-in. Upright Drill Press. Second-hand.

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### Special Notices.

## Second-Hand and New Machinery.

The following Tools ready for delivery at an early date:

Two Lathes, 15 in. x 6 ft. New.  
Three 30-in. Upright Back-Geared Drills. New.  
Four 24-in. Upright Back-Geared Drills. New.  
One 16-in. Upright Back-Geared Drill. New.  
One 11 in. x 5 ft. Lathe. New.  
One 11 in. x 5 ft. Foot Lathe. New.

### IN STORE.

Three Lathes, 23 in. x 12 ft. New.  
Four Lathes, 18 in. x 8 ft. New.  
One Lathe, 17 in. x 8 ft. Lincoln.  
Two Lathes, 16 in. x 6 ft. Wood & Light.  
One Lathe, 16 in. x 6 ft. Bladell.  
Two Lathes, 14 in. x 4 ft. 6 in.  
One Planer, 30 in. x 8 ft.

One Crank Planer, 12 in. stroke.  
One Milling Machine, No. 2. Wood & Light.  
One large Index Milling Machine.  
One No. 12 Bolt Cutter. New.  
One Burleigh Rock Drill, No. 4. New.  
One Knowles Pump, No. 7.  
One Cameron Pump, No. 2.  
One 100-ton Hydraulic Press and Pump.  
One Peck, Stow & Wilcox Foot Press.  
One large Bliss & Williams Foot Press.  
One 36-in. Daniels Planing Machine.  
One pair Paper Rolls.

One Pipe Cutting Machine.

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## Special Notices.

To Railroads, Mill Owners  
and Contractors.

STRUCTURAL IRON WORK  
FOR SALE.

Having purchased the Ironwork of the Main Centennial Building, situated in Fairmount Park, Philadelphia, we now offer the same in sections to suit purchasers. These buildings can be sold in widths varying from 100 to 168 feet, and of any height, from 40 feet down to 25 feet, and in length from 100 to 700 feet. We have eight Spiral Stairways, in all over 800 steps.

Plans showing how all parts of these buildings may be utilized in railroad depots, etc., have been prepared by Messrs. Wilson Bros. & Co., of Philadelphia, civil engineers and architects, and can be seen at the office of Mackintosh, Hemphill & Co., limited, Fort Pitt Foundry, Pittsburgh, Pa., or at the office of the company, at Centennial Building, West Philadelphia.

Wishing to dispose of the above quickly, we are prepared to offer great inducements to purchasers, both as to low price of material and promptness of delivery. Any communications addressed to the CENTENNIAL STRUCTURAL CO., care of Mackintosh, Hemphill & Co., limited, will receive prompt attention.

## For Sale.

An old and well-established

IRON FOUNDRY AND  
MACHINE SHOP.

doing a large and lucrative business in the

CITY OF DETROIT.

Engine and other patterns modern and abreast of the times. Reason for selling, failing health of owner. Address A. B. C., Detroit, Mich.

## STEEL:

Its History, Manufacture, Properties, and Uses.

By J. S. JEANS,

Secretary of the Iron and Steel Institute.

Section I. History of Steel: Chap. 1. History of Steel; 2. Early History in England; 3. Progress of Invention; 4. History of Bessemer Process; 5. Siemens-Martin Process; 6. Other Steel-making Processes; 7. Steel in America; 8. Germany; 9. France; 10. Austria; 11. Russia; 12. Sweden; 13. Other Countries.—Section II. Manufacture of Steel: Chap. 1. Cementation and other Methods; 2. Manufacture by Bessemer Process; 3. Siemens-Martin Process; 4. Other Methods.—Section III. Chemical and Physical Properties of Steel: Chap. 1. Phosphorus in Steel; 2. The Use of Manganese; 3. Silicon in Steel; 4. Sulphur in Steel; 5. Tensile Strength of Steel; 6. Mechanical Tests of Steel; 7. Analysis of Steel.—Section IV. Uses of Steel: Chap. 1. Application of Steel to Railway Purposes; 2. To Shipbuilding; 3. To Bridge Building; 4. To General Purposes; 5. Guns and Armor Plates; 6. Other Purposes.

Price, . . . . . \$1.50

FOR SALE BY

DAVID WILLIAMS,  
83 Reade Street, New York.

## For Sale.

On reasonable terms, to reliable parties, an established paying Hardware business in La Grange, Ga. The only concern of the kind within the county. Address P. O. BOX 2071, New York.

## For Sale.

ONE 40-LB. BRADLEY CUSHIONED HAMMER, latest pattern. Will be finished and ready for delivery in a few days. For particulars, address H. WIARD, Care of Syracuse Chilled Plow Co., Syracuse, N. Y.

## Wanted.

A live, active firm desires to act as Manufacturers' Agents in Chicago and the West. Please address MANUFACTURERS' AGENTS, Office of The Iron Age, 35 & 37 Clark St., Chicago, Ill.

## Wanted.

A situation as traveling salesman. Have had some experience in the Hardware business, and can sell goods on the road. Will travel either for a moderate salary, or on commission. Address FRANKLIN, Office of The Iron Age, 35 Reade St., New York.

## Partner Wanted.

In a well-established Hardware business. Capital required, \$4,000 to \$5,000; yearly sales, \$40,000; stock from \$10,000 to \$12,000; good profits; managed by a practical hardwareman. Address LUDWIG & CO., Buena Vista, Colorado.

## For Sale.

The retail Hardware business in Canastota, N. Y.; stock about \$10,000. Sold on account of poor health of the proprietor. Doing a large and flourishing trade. Address for further particulars, H. C. JARVIS, Canastota, Madison Co., N. Y.

## For Sale.

A Beam Engine in perfect order; 24-in. cylinder, 4 ft. 6-in. stroke. Automatic cut-off. Also, several powerful Hydraulic Pumps as good as new. Apply by letter to M. W. GRISWOLD, 27 Beekman St., N. Y.

WANTED.—By a young man with two years' experience in the retail hardware business, on or before Jan. 1st, a position as salesman in a wholesale house. Best of reference given. Address LOCK BOX 44, Lockport, N. Y.

WANTED.—Position in Hardware stock, wholesale or retail; competent party; ten years' experience; acquainted with all details, manufacturers, &c.; capable of managing. Address N. E. V., Office of The Iron Age, 35 Clark St., Chicago, Ill.

WANTED.—A young man wants a position in a first-class Hardware house as traveling salesman. Has had nine and a half years' experience in the General Hardware business. Best of references. P. O. Box 79, Lewistown, Pa.

WANTED.—By a young man with five years' experience in the hardware trade, a position as Salesman for a Wholesale Hardware house or manufacturing firm. Can give references in New York and also in Southern cities. Address R. W. S., Office of The Iron Age, 35 Reade St., New York.

## Trade Report.

OFFICE OF THE IRON AGE,  
WEDNESDAY EVENING, Dec. 14, 1881.

With the close of the week, at the last hour of business to-day, it became known in Wall street that the entire amount of bonds (\$5,489,500) included in the 160th call had been offered at the Sub-Treasury and accepted by the Government. Immediately the rate for call loans fell to plain 6%, in prospect of continued liberal disbursements from the Treasury, as the prepayment of \$5,000,000 more a week hence is confidently anticipated. There was a further feeling of relief in the better prospect that both Houses of Congress will favorably consider the proposition to refund the debt at 3%. The conservative tone of the President's Message and accompanying reports from the Secretaries, have gone far to reassure those who had any doubts respecting the stability of our financial system, or were apprehensive of recommendations tending to unsettle our trading and manufacturing interests. The suggestions from these sources respecting the silver question, internal revenue taxes, the tax on bank deposits, &c., are all in accordance with views entertained by our best political economists.

Government bonds were strong to-day for the extended 5's; the extended 6's declined 1/4, and the 4's and 4 1/2's were unchanged. Considerable purchases have been made within the week by financial institutions, other corporations and individuals, for purposes of investment.

The money market has been stringent all the week, as high as 1/4 % being paid for call loans, in addition to legal interest. First class commercial paper commands 6%, and only the highest grades are in demand. It is remarked, however, that money has not been so stringent this month as it was one year ago, when the weekly importations of gold averaged over \$3,000,000.

The foreign exchange market continues dull and steady. There is no change in the posted rates for prime bankers' sterling; the actual rates are \$4.80 @ \$4.80 1/2 and \$4.84 @ \$4.84 1/2.

A condition of torpor has characterized the Stock Exchange during most of the week. From this remark may be excepted Louisville and Nashville, Richmond and Danville, Hannibal and St. Joseph, and some other of the specialties, which were more or less active at advancing figures. The market at first was irregular, influenced by active money, but there was a recovery toward the close, with a stronger tone. Comparing sales of stocks at the opening and at the close, the principal changes are as follows:

Advanced—N. Y. C.	1/4	Han. & St. Jos. pref.	3/4
Canada Southern	1/2	Omaha	1/2
Louisville and Nash.	1/2	Omaha preferred	1/2
Western Union	1/2	Texas Pacific	1/2
Northern	1/2	Missouri Pacific	1/2
Columbus, Chic. & N.	1/2	Nashville, Chic. & N.	1/2
Ind. Cent.	1/2	St. L.	1/2
Chic. Bur. & Quincy	1/2	Hannibal & St. Jos.	1/2

The status of the railroad war is at last more clearly understood. Wm. H. Vanderbilt denies that he is any longer responsible for the disagreement among the trunk lines. He has offered to refer the main point at issue—the question of differential rates—to Chas. Francis Adams, Jr., for final adjudication; but the proposition was rejected, whereupon Mr. Vanderbilt suggests that the business men of the country should settle the dispute.

In general trade business continues quiet, outside of those specialties adopted to the holiday season. The stringency in money has operated as a check, and the speculative views of the holders of staple commodities retard the export movement. Within the last day or two, however, there is an improved demand for corn and wheat, particularly the latter, which is wanted to fill freight room in the fleet of overdue steamers recently arrived, and which can hardly be taken as a sign of permanent improvement. Included in the shipments are 700,000 pounds of bacon for Havre, the first shipment of the kind to France since last spring. The total exports of produce since Jan. 1 this year are \$350,692,330, against \$384,281,238 last year; imports of general merchandise, \$397,690,287, against \$450,546,387 last year.

The new rates for western-bound freights which will probably be adopted after Jan. 1 next by the trunk lines, and which were agreed upon at the meeting of the trunk lines on Monday, are as follows: First-class, 60 cents; second-class, 50 cents; third-class, 45 cents, and fourth-class, 35 cents.

The importations of specie and bullion at this port during the week ending Dec. 9 were \$285,633, consisting of \$189,678 in gold and \$95,955 in silver, as against a total of \$3,581,932 for the week ending Dec. 11 last year. The importations since the 1st of January and since the 1st of August compare as follows with the movement during the corresponding periods last year:

Since January 1—1881.		1880.	
Gold	\$51,919,183	\$51,919,183	\$51,919,183
Silver	2,714,479	2,714,479	2,714,479
Total	\$54,633,662	\$54,633,662	\$54,633,662
Since August 1—1881.		1880.	
Gold	\$23,704,924	\$23,704,924	\$23,704,924
Silver	960,550	960,550	960,550
Total	\$24,665,474	\$24,665,474	\$24,665,474

The bank return for the week shows a loss of \$531,100 in reserve, which now stands

at \$561,975 below, against \$83,200 below at this time last year, and \$5,583,500 above at the corresponding period in 1870.

The following is an analysis of the bank totals of this week compared with that of last week:

	Dec. 3.	Dec. 10.	Comparison.
Loans	\$315,321,700	\$314,788,900	Dec. 532,800
Specie	55,316,800	54,858,900	Dec. 457,900
Legal T'ry	15,361,700	15,740,400	Dec. 378,700
Total reserve	72,178,500	70,590,200	Dec. 1,588,300
Deposits	285,437,500	285,243,100	Dec. 194,400
Reserve required	71,600,375	71,261,475	Dec. 338,900
Surplus	\$430,875	\$428,725	Dec. 1,150
Circulation	20,138,200	20,236,400	Inc. 98,200

\* Deficiency.

The closing quotations for Government

	Bid.	Asked.
U. S. 4 1/2's 1891 registered	114 1/2	114 3/4
U. S. 4 1/2's 1891 coupon	114 1/2	114 3/4
U. S. 4's 1897 registered	117 1/2	117 3/4
U. S. 4's 1897 coupon	118 1/2	118 3/4
U. S. Currency 6s 1893	118 1/2	118 3/4
U. S. Currency 6s 1896	118 1/2	118 3/4
U. S. Currency 6s 1897	118 1/2	118 3/4
U. S. Currency 6s 1899	118 1/2	118 3/4
Sizes continued	100 1/2	100 3/4
Fives continued	103 1/2	103 3/4

MINING STOCKS.

The following were the closing quotations for mining stocks:

	Bid.	Asked.
American Flag	15	19
Alma	3-00	3-00
Alma Mont.	1-00	1-00
Bechtel	10	30
Bodie	2-80	3-00
Buckeye	4	4
Bulwer	2-50	3-00
Bull Dog	35	40
Bonanza C.	0	10
Calaveras	7	7
Calaveras	7	7
California	42	45
Climax	39	48
Consolidated Imperial	7	10
Consolidated Virginia	1-50	1-50
Chrysolite	4-00	4-75
Cent. Ariz.	1-00	1-70
Chico	45	65
Dunderberg	70	70
Eureka C.	11-00	12-00
Findley	25	28
Fa. De-Smet	7-00	8-00
Granville	4	4
Gr. Prize	15	15
Great Eastern	8	10
Green Mountain	2-00	2-00
Horn Silver	15-50	16-50
Imperial	1-25	1-25
Independence	10	11
Iron Silver	2-15	2-20
Little Pitts	1-75	1-75
L. Chief	80	80
Mariposa	4-50	4-50
Moose	60	60
Navajo	12	18
North Star	10-12 1/2	10-12 1/2
Nor. Belle	10-12 1/2	10-12 1/2
N. Bell I.	25	30
Orizaba	35	35
Rappah'k	15	15
Robinson	3-00	3-50
R. Sun	06	06
Red Elephant	9	9
S. Nevada	10	10
Silver Cliff	2-30	2-30
Sutro	1-10	1-20
Sup'g Val.	1-40	1-40
St. Louis	1-25	1-25
S. Bulwer	25	25
South Hill	25	25
South Pacific	3-35	3-35
S. L. No. 1 and 4	27	27
St. L. and 3	1-50	1-50
Tuscarora	18	18
Union Con.	14-25	14-25
Unadilla	11	11
Vizina	9-55	2-60

## GENERAL HARDWARE.

The condition of the market has undergone no change since our last writing. Prices of several lines of goods have been advanced, the particulars of which will be found below.

The manufacturers of Strap and T Hinges held a meeting in this city to-day, but no changes in prices were made.

Sargent & Co. have advanced their prices for Plate and Hook Hinges as follows:

Page in Catalogue.  
46—No. 160, Fast Joint Plate Hinges, 6 to 12 in., 7 cents; 14 in. and larger, 6 cents per lb.  
47—No. 162, Fast Joint Plate Hinges, 6 to 12 in., 7 cents; 14 in. and larger, 6 cents per lb.  
48—No. 165, 168, Hook Hinges, 8 to 12 in., 7 1/2 cents; 14 in. and larger, 6 1/2 cents per lb.  
49—No. 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000.

Henry Diston & Sons will issue the following discount sheet for the coming season, which is the same in every particular as that used this year. They have issued a 15-page pamphlet, in which they illustrate some of their leading Saws and Tools for keeping Saws in order. Its title is "The Saw, How to Choose it, and How to Keep it in Order." This little book is full of practical suggestions of great value to mechanics and the trade. The illustrations are very handsome, being produced in natural colors. Each bundle of Diston's Saws will contain one of these books.

JANUARY 1, 1882.

Saw, Tool, Steel and File Works, Front and Laurel Streets, Philadelphia.

As some parties are imitating the goods manufactured by us by copying our numbers, styles and names, thereby deceiving the mechanic who desires our make of saws, we would request our customers to be careful in making their purchases. We guarantee to produce a better article at the same price than any other house in the world. All goods bearing the brand of Henry Diston & Sons are fully warranted. The above will be Factory Rates for the coming season, and bills unpaid by the 20th proximo will be drawn for at sight.

Henry Diston & Sons.

We have received the following:

[No. 4 1/2.]  
DISCOUNTS.

Forty-five per cent. discount on all Locks, Knobs and Lock Furniture, new catalogue, 1881, pages 341 to 596. From revised list prices, September 20th, 1881. Two per cent. may be deducted from invoices, if paid within 30 days. READING HARDWARE CO., READING, PA., December 2, 1881.

We have received from the secretary of the American Pocket Cutlery Association the following announcement:

NEW YORK, December 10, 1881.

From and after this date the selling prices of all Pocket Cutlery made by members of the American Pocket Cutlery Manufacturers' Association will be based on the recent classification of the same by said association, and all previous quotations are hereby withdrawn. For prices apply to members of the association as follows:

THE MILLER BROS. CUTLERY CO.,  
SOUTHWORTH CUTLERY CO.,  
ULSTER KNIFE CO.,  
NORTHFIELD KNIFE CO.,  
AMERICAN SHEAR CO.,  
AMERICAN KNIFE CO.,  
UNION KNIFE CO.,  
NAUGATUCK CUTLERY CO.,  
SPRAGUE & BOYDEN,  
HUMASON & BECKLEY MFG. CO.,  
EMPIRE KNIFE CO.,  
GARDNER MFG. CO.,  
NEW YORK KNIFE CO.,  
THE WALDEN KNIFE CO.,  
CENTRAL CITY KNIFE CO.,  
EXCELSIOR KNIFE CO.,  
CANASTOTA KNIFE CO.

R. A. NEAL, President.  
G. B. PIERPONT, Vice-President.  
F. H. CATLIN, Secretary and











Iron has been quiet since I last wrote, and has presented very few special features. The changes noted have been in both directions, some up and others down, but their scope has not been wide, and they have not been of a representative character. Generally speaking, matters remain steady all round, with an abundance of occupation at the works, and with a general disposition on the part of producers not to commit themselves too far in advance. The wisdom of this policy is unquestionable, but it is most difficult to embody it in practice. Middlemen and speculators will buy when they believe prices are at "hard pan," and at such junctures producers are rarely in a position to criticise their customers. They are too glad to sell on any terms in fact, and cannot pick and choose. On a rising market it is very different, and nobody can blame makers for endeavoring to retain control of their own lines of goods. At present they are believed to have been fairly successful in this direction, but it is not yet time for the measure of their success to be gauged. Three weeks or a month of slackness would alone administer a test. At all events it may now be stated and accepted as a fact that the great majority of the producers of iron and steel are proceeding very cautiously. They decline to undertake deliveries beyond the end of 1881, save on the express condition that the prices to be paid shall be those which obtain at the times of the deliveries. This is a sound condition, and if it could be universally enforced it would be the death of speculation. As a matter of fact, no such hard-and-fast line can be drawn, and so long as there are fluctuations in prices just so long will there be speculators. It has to be conceded, indeed, that these gentlemen have their uses, and that their action has on more than one occasion administered new life to some of our great industries. Just now the course of speculation—not in iron and steel pure and simple, but in all sorts of useful and adventurous projects—is wide and strong. The draftsman employed in drawing up private acts of Parliament for next session are excessively busy—indeed, they have not been so actively engaged since 1845, when the great railway era was in full swing. The whole of the new schemes have not yet been formulated, but it is already known that something over £100,000,000 of money are



## BRACKET SAWS



are now a staple article in all Hardware Stores. They make trade lively about Christmas time, when it would otherwise be dull. The demand is such that any dealer can sell a few if he has them in stock. During the past six years a great number of saws have been put on the market, of more or less merit, but at present the demand is almost wholly for the Lester and Rogers Saws. The Lester Saw with all of its attachments sells for \$10.00, and the Rogers Saw for \$3.50. These rates seem low, but we are able to sell at such prices Saws which give entire satisfaction, with no come-back on the Dealer.

We are also Headquarters for Saw Blades, Wood, Designs, and all things pertaining to the Bracket Sawing business.

A fair discount to the trade.

MILLERS FALLS CO., 74 Chambers St., New York.

HEATON & DENCKLA HARDWARE CO.,  
Hardware Commission Merchants,  
507 Commerce Street, Philadelphia.

E. & G. BROOKE'S "Anchor Brand" Nails, Brads, Spikes, &c.  
MALLORY, WHEELER & CO.'S Door and Pad Locks.  
UNION MANUFACTURING CO.'S Butts.  
AMERICAN SCREW CO.'S Screws.  
D. R. BARTON TOOL CO.'S Edge Tools, &c.  
FRANCE'S Shutter Holders.  
Anti-Window Rattlers, Brass and Nickel-Plated.  
WESTERN FILE CO.'S Cast-Steel Files.  
AMERICAN SHEAR CO.'S Shears and Scissors.  
HP NAIL COMPANY'S Wire, Steel, Iron and Brass Nails and Barbed Nails.  
STEELE & SONS' Wrought Handle Sad Irons.

EXCELSIOR MILLS, Genuine Turkish Emery.  
BROWN & BRO.'S Silver Plated Spoons and Forks.  
GAYLORD MANUFACTURING CO.'S Tins, Chest and Cupboard Locks.  
AMES' Genuine Chester Emery.  
COLWELL & COLLINS, NORWAY BOLT CO., Norway Carriage and Tire Bolts.  
PLYMOUTH MILL CO.'S Black and Tinned Iron Rivets.  
AMERICAN MACHINE CO.'S Fluters, &c.  
STUART PETERSON & CO.'S Tinned and Enamelled Ware, &c.

Also a large line of Heavy and Shelf Hardware.



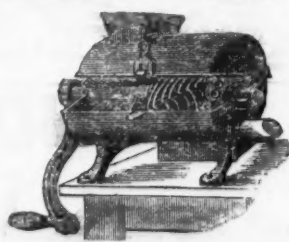
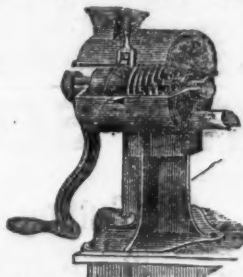
### VARIETY IRON WORKS.

KYSER & REX,

Manufacturers of  
Hardware Specialties, Iron Toys, Novelties  
and Housefurnishing Hardware,  
Main Office and Factory, Trenton Ave. and Margaretta St., Frankford, Philadelphia.  
Branch Office, 19 & 21 S. 4th St., Phila. Hardware specialties manufactured to order.

## Kieser's Gem. Kieser's No. 55

Double  
Shearing  
Cut.  
Solid  
Cast  
Steel  
Blades.



Patented Sept. 14, 1880.

Family Meat Cutters are the best made.

Every family should have one. Will thoroughly cut Raw or Cooked Beef or Pork, Vegetables, Cucumbers, Pine Apples, &c. Will cut forty pounds sausage meat an hour.

Every Druggist should have one for cutting Roots, Vanilla Beans, &c.  
Easily worked. Easily cleaned. Will not get out of order. Ask your dealer for them.

Send a postal for Circular with testimonials. Will send one as sample by express upon receipt of \$2.00.

Are Made on the Same Principle as the Gem Meat Cutters,

But with capacity to cut 100 pounds Pork an hour.

Will send one as sample on receipt of \$2.00. Our No. 1 Butcher, for hand or power, will cut 300 pounds an hour.

Our No. A Butcher for power, will cut 1000 pounds an hour. We warrant our Cutters to do the work more thoroughly than any other machine made.

Also Sole Manufacturers of

KIMBALL'S PATENT SHOVELS & SPADES,  
BOSS PATENT MOLASSES GATES,  
LOCKWOOD'S PATENT HOES.

KIMBALL SHOVEL CO.,

Office, No. 67 German St., Baltimore, Md.

CHARLES H. HOWELL & CO.,

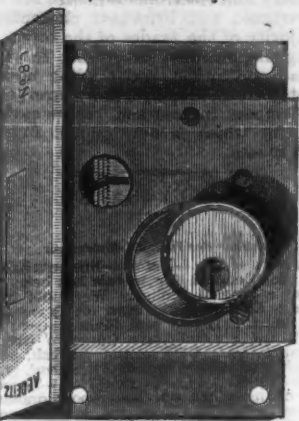
MANUFACTURERS OF FIRST QUALITY

PAINTS, COLORS, OILS, VARNISHES, DRYERS.

212, 214 & 216 Race St., Philadelphia, U. S. A.

## A. E. DIETZ,

(Successor to Barnes & Dietz.)  
Manufacturer of  
Store Door Locks, Night Latches, Padlocks, Drawer Locks, &c., with Flat Steel Keys.



Durrie & McCarty, Agents.  
97 Chambers & 81 Reade Sts., New York.

THE FORSYTH SCALE CO.,  
YOUNGSTOWN, O.,

Manufacture a full line of

FORSYTH'S STANDARD SCALES,  
Counter, Portable, Dormant,  
Stock and Hay, and  
R. R. Track  
SCALES.

Call Special Attention to their  
SUSPENSION HAY & R. R.  
TRACK SCALES.

Also, Warehouse Trucks and Letter Presses.  
PRINCIPAL WAREHOUSES,

DURRIE & McCARTY, New York;  
FORSYTH SCALE CO., Chicago;  
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### PRIZE MEDALLISTS:

Exhibitions of 1862, 1865, 1867, 1872, 1873, and only award and medal for Noiseless Steel Shutters at Philadelphia, 1876; Paris, 1875, and Melbourne, 1881.

CLARK, BUNNETT & CO.,  
LIMITED,

Late CLARK & COMPANY,

Original Inventors and Sole Patentees of

Noiseless Self-Colling Revolving

STEEL SHUTTERS,

FIRE AND BURGLAR PROOF. ALSO IMPROVED

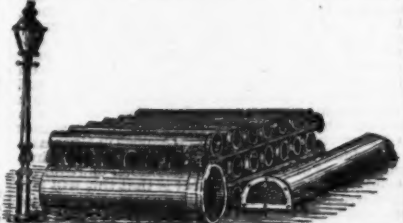
ROLLING WOOD SHUTTERS,

Of various kinds. And Patent

METALLIC VENETIAN BLINDS.

Endorsed by the  
Leading Architects of the World.

Send for Catalogue.  
Office and Manufactory,  
162 & 164 West 27th St., N. Y.



R. D. WOOD & CO.,  
Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS,

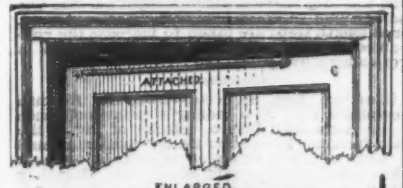
Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

THE PERFECT  
DOOR SPRING.

[Patent Applied for.]



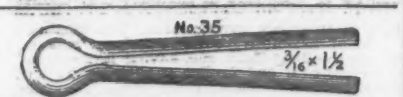
Costs less, and surpasses in Simplicity  
Durability and Perfection all other  
contrivances for Closing Doors.

Send for explanatory Circular and Price List.

The Perfect Door Spring Mfg. Co.,

Sole Manufacturers,

328 Seventh Ave., New York.



BROWNING, SISUM & CO., 85 Chambers St.,  
Manufacture  
Belt Hooks, Cutters, Spring Keys, D Rings,  
Staples, and everything pertaining to wire binding.  
Factory, BROOKLYN.

## L. COES'

Genuine and Mechanics

PATENT

Screw Wrenches

MANUFACTURED BY

L. COES & CO.,

Worcester, Mass.

ESTABLISHED IN 1839.



Our Genuine Wrenches are made with  
straight bars, full width and enlarged jaw, hav-  
ing ribs cast inside, which strengthen the jaw  
and give a full bearing on front of bar. These  
improvements, in combination with our new  
ferrule, made with double bearings, an iron  
tube, fitted to the shank and resting against  
the lower bearings, rigidly hold in position by  
the handle and nut, effectually preventing back  
thrust of ferrule (see sectional view), verify  
our claim that we manufacture the heaviest  
and strongest Wrench in the market. None  
genuine unless stamped

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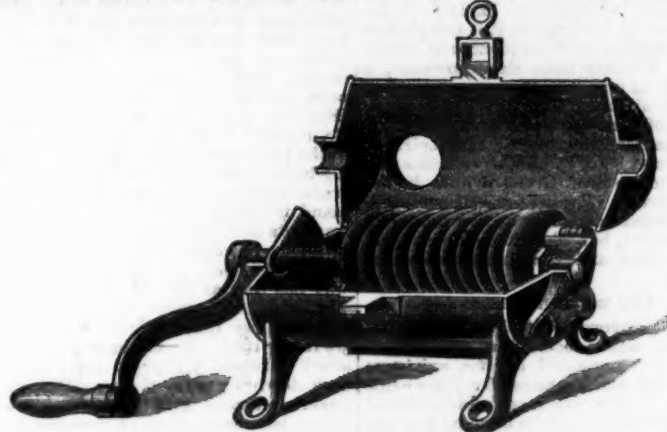
97 Chambers and 81 Reade Sts.,

NEW YORK.

DURRIE & McCARTY,

Sole Agents.

## THE PENNSYLVANIA MEAT CUTTER



Has the capacity of Cutters upon the market which cost 20 per cent. more money.

### PRICE LIST.

No. 1, containing 8 Steel Knives... per dozen, \$24.00  
No. 2, containing 11 Steel Knives... " " 36.00  
No. 3, containing 12 Steel Knives... " " 36.00  
Nos. 1 and 2 are packed 1/2 dozen in a box; No. 3 packed 1/4 dozen in box.  
Discount to the trade 30 per cent. Orders solicited.

LLOYD, SUPPLEE & WALTON, Philadelphia.

DURRIE & McCARTY, New York City.

## CHAMPLAIN

Forged Horse Nails.

MANUFACTURED BY THE

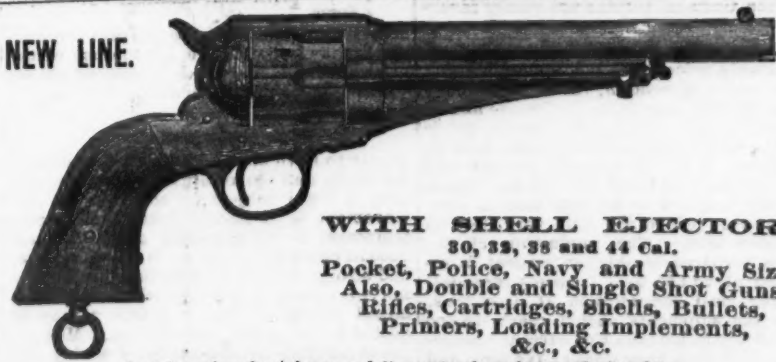
NATIONAL HORSE NAIL CO.,

Vergennes, Vermont.

HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
NORWAY IRON AND WARRANTED.

A full line of "CHAMPLAIN" and "NATIONAL"  
Nails always on hand at our Warehouse,  
97 CHAMBERS AND 81 READE STREETS, NEW YORK.  
DURRIE & McCARTY, Sole Agents.

NEW LINE.



WITH SHELL EJECTOR

30, 32, 35 and 44 Cal.

Pocket, Police, Navy and Army Sizes.

Also, Double and Single Shot Guns.

Rifles, Cartridges, Shells, Bullets,

Primers, Loading Implements,

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Send for reduced catalogue and discounts of goods manufactured by

E. REMINGTON & SONS,

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NEW YORK AGENT.

S. H. & E. Y. MOORE,  
163 & 165 Lake Street,  
CHICAGO AGENTS.



proposed to be expended. This amount, which may be doubled prior to the end of November (before which the necessary notices and advertisements must be published), will be expended in railroad, tramway, electric light, telephone, steamship, trading, commercial, mining, industrial and other enterprises. Many new railways around London are projected—one scheme alone involving the making of 24 lines—and the principal roads seek powers to extend and improve their several undertakings. Tramways in the metropolis and its vast series of suburbs are also prominent. They are good investments and offer legitimate attractions to those who seek something better and more permanent than ordinary stock exchange securities. In many of the large and some of the smaller towns these lines are to be extended, and it is even proposed to construct them along the common roads of tolerably populous rural localities, where they may act as feeders to the existing railroads, as well as create a passenger traffic of their own. These railroad and tramway schemes will necessarily need a great quantity of iron and steel, especially rails. The tramways will also require a large supply of cars, probably from the United States, as we do not seem able to make them for ourselves. Docks and port improvements will, further, cause a considerable expenditure, and the network of telephones will enhance the demand for wire and miscellaneous fittings. As to the application of Siemens Bros. and others for powers to lay in cables, fix machinery, &c., for the supply of light and power to manufacturing, dwelling houses, &c., there will be a severe parliamentary fight, as the innovators will have to face the formidable array of vested interests sure to be marshaled in battle array against them. Generally speaking, British public opinion is favorable to the electric light, but when it comes to a question of touching gas shares and other (now) sound investments it may prove to be a horse of another color. Steamship enterprise is another form of enterprise likely to be developed, not by Parliament, it is true, but as one of the legitimate consequences of active business. Further than this, however, I need not go at present. It may suffice when I say that all around us there are many symptoms of renewed commercial activity, and of the reawakening of that spirit of enterprise and "go," which have in the past done so much to keep Great Britain in the van of progress. The present—or coming—spirit will almost certainly be overdue like its predecessors, but while it endures it will have important and widespread influences and effects.

#### THE MONEY MARKET

is not wholly favorable at the moment for speculators, whose operations are confessedly greatly hampered by the existence and prolonged maintenance of a 5 per cent. bank rate. There are many old-fashioned persons who hold this to be a most fortunate circumstance for the best interests of all departments of legitimate business, but the speculators, and those who wish to grow rich in a few weeks, rather than by the steady pursuit of trade, are immensely dissatisfied. They adduce the plenitude of money in the country, the absence of foreign loans and sundry other circumstances, as proofs of the absurdity of dear money, but their arguments fall flat and stale, and they find their wailings unheeded. Last week the return of the Bank of England showed the following figures:

Rest.....\$1,124,870 Increase.....\$2,126  
Public deposits.....4,204,532 Increase.....1,082,091  
Other deposits.....22,280,797 Decrease.....1,033,423

On the other side of the account:

Gov't securities.....\$13,244,014 No change.....  
Other securities.....20,350,882 Decrease.....\$291,417  
Notes uncirculated.....9,993,135 Increase.....466,630

The amount of notes in circulation is \$25,551,275, being a decrease of \$244,295, and the stock of bullion in both departments is \$20,610,746, showing a decrease of \$70,273 when compared with the preceding return. This gives an increase of \$264,000 in the reserve during the week, and brings it to 40 per cent. of its proportion to liabilities. There is a falling off in the bullion stock of over \$6,000,000, as compared with a year ago, and the reserve is a further \$5,000,000 lower. These figures show the necessity for caution, especially in the face of not dissimilar features on the Continent, where the French Bank is uncomfortable and the German returns not wholly favorable.

#### THE IRON MARKET

as regards prices, has not undergone any considerable alteration, and, as I have already briefly stated, the works are almost universally well employed. Scotch pig is steady, and there has been more done in warrants. It is stated that in makers' own hands in Scotland there are 335,000 tons of pig, which, added to 617,000 tons in Connaught's stores, brings the total very close to 1,000,000 tons. The production of the Scotch furnaces weekly at present is estimated at 22,600 tons from 105 furnaces, and the local consumption at 9500 tons, hence the shipments should reach 13,000 tons weekly to balance the current production. Last week they were 11,153 tons, and 2014 tons were added to the official stores, so that something like 1000 tons may have been transferred to Connaught's care from makers' yards. A year ago makers' own stocks in Scotland were about 223,000 tons, and Connaught's 481,000 tons, hence during the interval the make has exceeded the consumption by nearly 250,000 tons, assuming that the two conditions were equal a year ago, which was by no means the case. Cleveland is quietly firm. The estimated weekly output of ordinary pig-iron there is about 47,000 tons from 116 furnaces. The local consumption and rail deliveries are set down at 33,500 tons, leaving a balance for shipment of about 14,000 tons. Last week's shipments were over 19,000 tons, hence the reserve is declining. In Connaught and other public stores at Midland's there are 191,000 tons, and in makers' hands about 206,000 tons, a total of, say, 397,000 tons, and a decrease of 6000 tons on the week. The total diminution for November will probably reach over 20,000 tons. On the West Coast the 63 furnaces at work on hematites produce about 32,000 tons weekly. The local consumption and rail

deliveries are believed to reach 19,000 tons, leaving 13,000 tons for shipment. In the official stores there are 7000 tons, and in makers' own yards about 43,000 tons—a very moderate reserve indeed. Were statistics similar to these obtainable from other localities it would be possible to calculate the probable course of business much more exactly than at present, and it is highly probable that the trade would be kept on a better and safer basis. In finished iron there has been no change. Staffordshire list prices for marked bars remain at £7. 10/; Welsh bars, £5. 10/; iron rails, £5. 10/ for 50 pounds and upward; old rails D. H., £4. 15/ @ £4. 17/6; heavy wrought scrap, £4. 5/ @ £4. 7/6; old cast scrap, £2. 3/ @ £2. 6/; Bessemer blooms 7 by 7 inches and upward, £5. 12/6; rail crop ends, £3. 7/6 @ £3. 10/; steel rails purely nominal, as makers have nothing to offer on prompts, and tinplate firmer at 16/6 @ 17/6 for cakes, and 19/6 @ 21/ for charcoals. The scarcity and dearth of freights is hindering business. Some of the wharves and quays in Wales and elsewhere are quite blocked up with goods waiting for bottoms.

#### SCOTCH PIG IRON

is steady, after some fluctuations during the week. The miners have not started a strike, as had been anticipated, but have resolved to try a general restriction of their working time to four days weekly. Should they enforce this policy it would have the effect of making fuel, and therefore iron, dearer. Shipments of pig iron continue large for the season, notwithstanding the tremendous freights demanded for Transatlantic lots. Steam from Glasgow to New York is quoted 15/ for small parcels and intermediate rates down to 12/6 for larger consignments. Probably the outside rate has rarely been obtained. There are 105 furnaces (including 9 on hematites) at work in Scotland, against 120 a year ago. In Connaught's stores there are 617,477 tons against 481,513 tons this date 1886. To date this year shipments have been 524,479 tons, or 88,815 tons below 1886, while importations of Cleveland pig into Scotland have been 273,447 tons, a comparative increase of 40,151 tons. Warrants have ranged from 51/3 to 50/4 since my last, being now about 50/9 @ 51/. Writing from Glasgow, November 26, James Watson & Co. report: "We have no change to report in the position of our market, the price having been comparatively steady. The home trade continues active, but the export demand is quieter. On Monday the price of warrants declined from 51/3 to 50/9 per ton, rallying, however, the following day to 51/3 1/2 per ton. On Wednesday the market was flat and as low as 50/8 was accepted. Yesterday the market opened dull at 50/6 @ 50/4 1/2 per ton, afterward improving to 50/10 per ton. To-day business was transacted between 51/ eight days and 50/10 cash down to 50/8, closing sellers at 50/9, buyers offering 50/8 per ton. The shipments last week were 11,153 tons, as compared with 7951 tons for the corresponding week of last year." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow.....	51/6	48/6
Garrabherrie, at Glasgow.....	50/	54/
Coltness.....	50/6	53/
Summerlee.....	50/6	53/
Langloan.....	50/6	53/
Carnaroe.....	50/6	50/
Caldar.....	50/6	50/
Glenarrock, at Ardrossan.....	50/6	50/
Ellington.....	51/6	48/
Darmington.....	51/6	48/
Shotts, at Leth.....	50/6	53/
Kimball, at B's mouth.....	50/6	49/6
Carron, at Grangemouth.....	51/6	50/6

The figures of John E. Swan & Bros., Limited, are in accord with these, and they report the Scotch iron and steel trades busy in all directions.

#### CLEVELAND IRON

is steadily firm, but without especial feature to note. The month's shipments of pig are expected to reach over 80,000 tons, an excellent total for this late period of the year. The local works are all remarkably busy, especially plates, angles and bars. It is reported that an attempt is likely to be made to run gridler works in opposition to the Belgian products of that ilk, of which the use in this country has attained very large proportions. Current rates for Cleveland G. M. B. Pig, net cash, f. o. b. makers' wharves in Tees are:

	No. 1.	No. 2.	No. 3.
No. 7 Foundry.....	46/	Mottled.....	42/6
".....	44/	White.....	40/
".....	42/	Refined Metal.....	58/
".....	41/6	Kentledge.....	41/6
4 Forge.....	41/		

Heavy importations of Spanish ores continue to be made into the Tees, for the use of the blast furnaces and steel works, which are working up to the full limits of their respective capacities.

#### WEST COAST HEMATITES

appear to have been a trifle less firm during the week, and the nominal quotations have been a little subject to shading, but the movement is of no significance and purely temporary in its character and incidence. Second holders are said to be few in number and strong, so that makers have every reason to regard the future with confidence. Mixed parcels of Nos. 1, 2 and 3 may be quoted 60/ @ 61/ at the moment. Makers' prices (subject to concessions, probably, for large lots) are:

	No. 1.	No. 2.	No. 3.
Cleator.....	66/	66/	64/
Lonsdale.....	61/6	60/6	59/6
Workington.....	61/6	60/6	59/6
West Cumberland.....	61/6	60/6	59/6
Lowther.....	61/6	60/6	59/6
Boss Bay.....	61/6	60/6	59/6
Distington.....	61/6	60/6	59/6
Harrington.....	61/6	60/6	59/6
Silway.....	61/6	60/6	59/6
Maryport.....	61/6	60/6	59/6

Last week's shipments comprised 10,614 tons pig iron and 3770 tons blooms and rails. The Continental demand is stronger, but business is restricted by the scarcity of steam freights.

#### THE HARDWARE TRADES

are in a condition which is generally deemed to be satisfactory, so far as the amount of occupation is in question, although there are still some complaining on the subject of profits. Prices are slowly approximating to the enhanced cost of iron and metals, so that the new year will probably witness some leveling up of quotations. The unusually mild weather—varied every few days by "American" storms of great severity—is somewhat against the "season"

trades, but it is favorable to hardware in general, besides affording the farmers opportunities for work which can rarely be performed so late in the year. At Sheffield the cutlery and electroplate houses are making overtime, and briskness characterizes the majority of the trades of the town. At Birmingham business progresses favorably all round and prices are tending upward. Tin plates are 1/ to 1/6 per box dearer, owing to the firmness in iron and the remarkable rise in tin, which is now quoted £110 for English ingots.

#### FOREIGN.

##### FRANCE.

*Moniteur des Interests Matériels.*  
PARIS, Nov. 27, 1887.—Metals.—Business has been duller; the demand for metals has been slack involving a general decline. We quote toward close: Copper—Chili Bar 165 @ 170 francs per 100 kilos; Ingots and Slabs, 172-75; Best Selected, 178-25; and pure Corocoro Ore, 165. Tin—Banco, 270; Billiton and English, 267-50; Straits and Australian, 266-25. Lead, 17-75 @ 18; Spelter, 15-50 @ 16. Iron—Belgium has been no change since our last report, quotations still being as follows: Merchant, 20 francs per 100 kilos; Flooring ditto, 21; large plates, 23, and common sheet, 25-50. The latter in particular are very firm, and it is believed they will soon command 27 francs. Old Rails are wanted at 12-50 @ 13; delivered at the rolling mills. Affinage Pig sold at 6-50 @ 6-70, and "Mouillage" at 6-50 @ 6-70. The iron works in the North of France have paid for Old Rails in Belgium 9-50 francs per 100 kilos. At Paris Wire Nails have brought 30 francs for No. 20 in store. For export, 160 of No. 25, 350 of No. 30, and 200 of No. 35, all at 25 francs. In the Haute-Marne orders continue flocking in at such a rate that producers there have it pretty much there own way. The ensuing are the quotations in that department: No. 20, 25 @ 25-50; No. 25, 26 @ 26-50; No. 30, 27 @ 27-50; No. 35, 28 @ 28-50; No. 40, 29 @ 29-50; No. 45, 30 @ 30-50; No. 50, 31 @ 31-50; No. 55, 32 @ 32-50; No. 60, 33 @ 33-50; No. 65, 34 @ 34-50; No. 70, 35 @ 35-50; No. 75, 36 @ 36-50; No. 80, 37 @ 37-50; No. 85, 38 @ 38-50; No. 90, 39 @ 39-50; No. 95, 40 @ 40-50; No. 100, 41 @ 41-50; No. 105, 42 @ 42-50; No. 110, 43 @ 43-50; No. 115, 44 @ 44-50; No. 120, 45 @ 45-50; No. 125, 46 @ 46-50; No. 130, 47 @ 47-50; No. 135, 48 @ 48-50; No. 140, 49 @ 49-50; No. 145, 50 @ 50-50; No. 150, 51 @ 51-50; No. 155, 52 @ 52-50; No. 160, 53 @ 53-50; No. 165, 54 @ 54-50; No. 170, 55 @ 55-50; No. 175, 56 @ 56-50; No. 180, 57 @ 57-50; No. 185, 58 @ 58-50; No. 190, 59 @ 59-50; No. 195, 60 @ 60-50; No. 200, 61 @ 61-50; No. 205, 62 @ 62-50; No. 210, 63 @ 63-50; No. 215, 64 @ 64-50; No. 220, 65 @ 65-50; No. 225, 66 @ 66-50; No. 230, 67 @ 67-50; No. 235, 68 @ 68-50; No. 240, 69 @ 69-50; No. 245, 70 @ 70-50; No. 250, 71 @ 71-50; No. 255, 72 @ 72-50; No. 260, 73 @ 73-50; No. 265, 74 @ 74-50; No. 270, 75 @ 75-50; No. 275, 76 @ 76-50; No. 280, 77 @ 77-50; No. 285, 78 @ 78-50; No. 290, 79 @ 79-50; No. 295, 80 @ 80-50; No. 300, 81 @ 81-50; No. 305, 82 @ 82-50; No. 310, 83 @ 83-50; No. 315, 84 @ 84-50; No. 320, 85 @ 85-50; No. 325, 86 @ 86-50; No. 330, 87 @ 87-50; No. 335, 88 @ 88-50; No. 340, 89 @ 89-50; No. 345, 90 @ 90-50; No. 350, 91 @ 91-50; No. 355, 92 @ 92-50; No. 360, 93 @ 93-50; No. 365, 94 @ 94-50; No. 370, 95 @ 95-50; No. 375, 96 @ 96-50; No. 380, 97 @ 97-50; No. 385, 98 @ 98-50; No. 390, 99 @ 99-50; No. 395, 100 @ 100-50; No. 400, 101 @ 101-50; No. 405, 102 @ 102-50; No. 410, 103 @ 103-50; No. 415, 104 @ 104-50; No. 420, 105 @ 105-50; No. 425, 106 @ 106-50; No. 430, 107 @ 107-50; No. 435, 108 @ 108-50; No. 440, 109 @ 109-50; No. 445, 110 @ 110-50; No. 450, 111 @ 111-50; No. 455, 112 @ 112-50; No. 460, 113 @ 113-50; No. 465, 114 @ 114-50; No. 470, 115 @ 115-50; No. 475, 116 @ 116-50; 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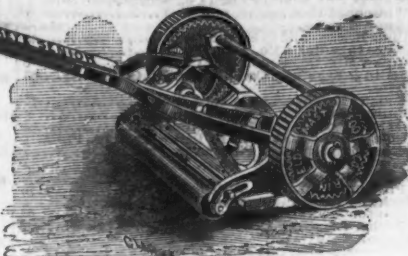
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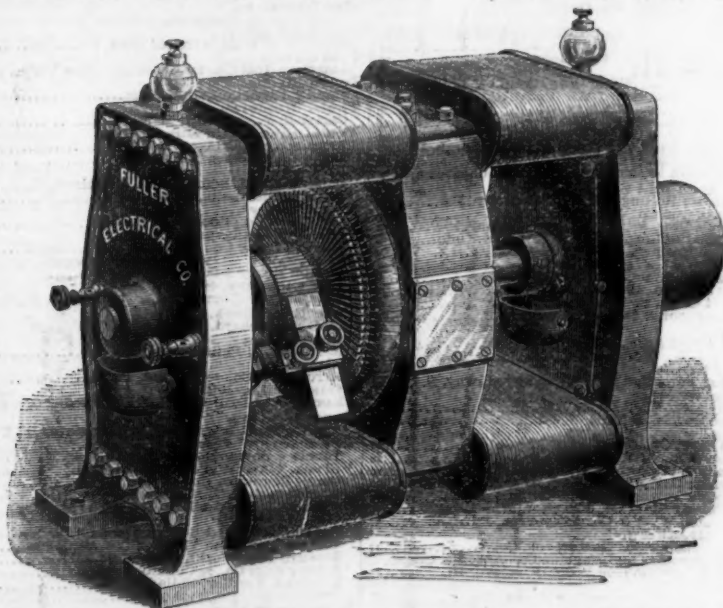
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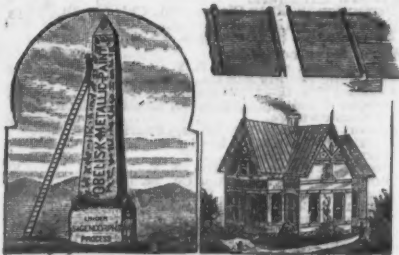
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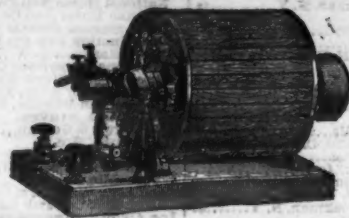
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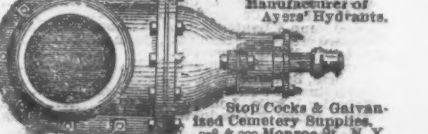
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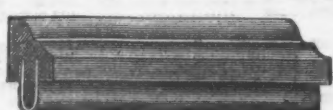
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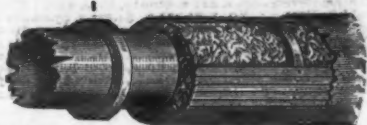
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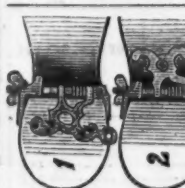


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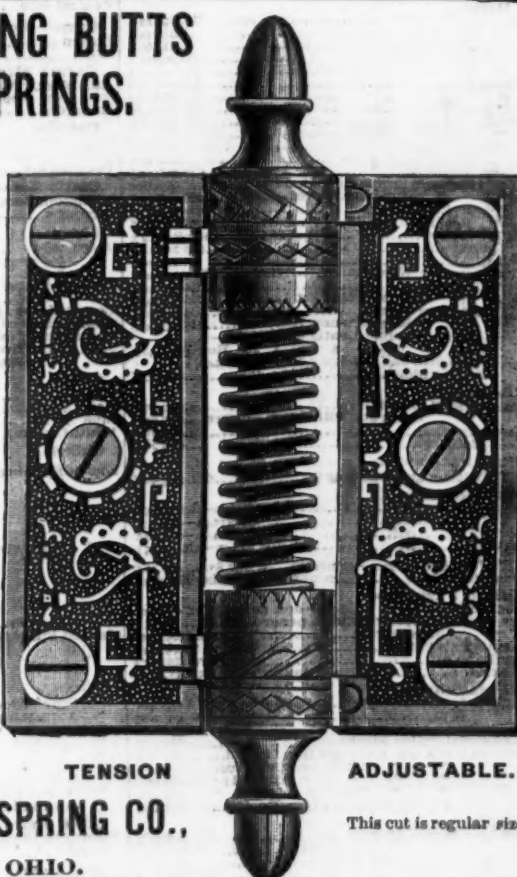
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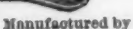


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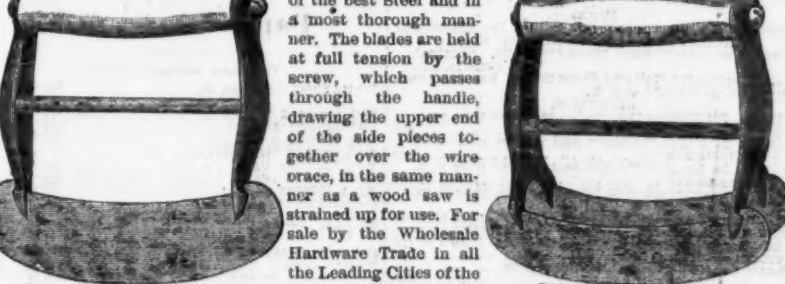
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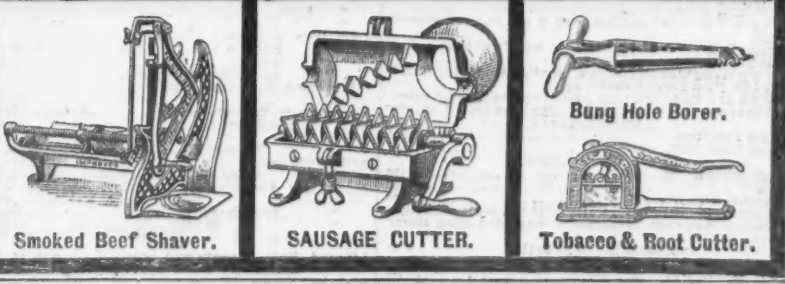
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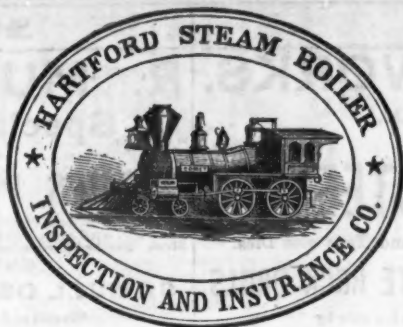
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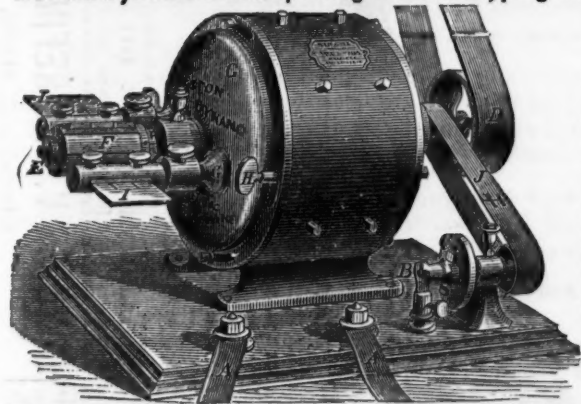
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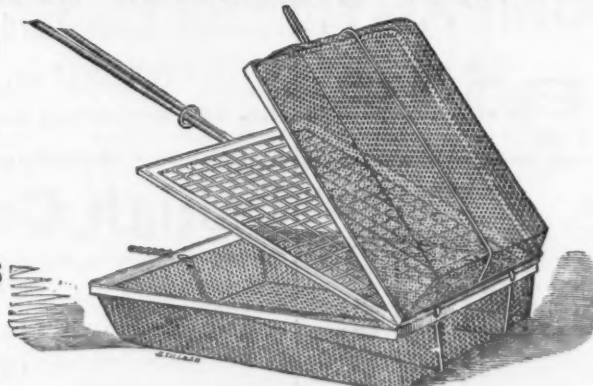
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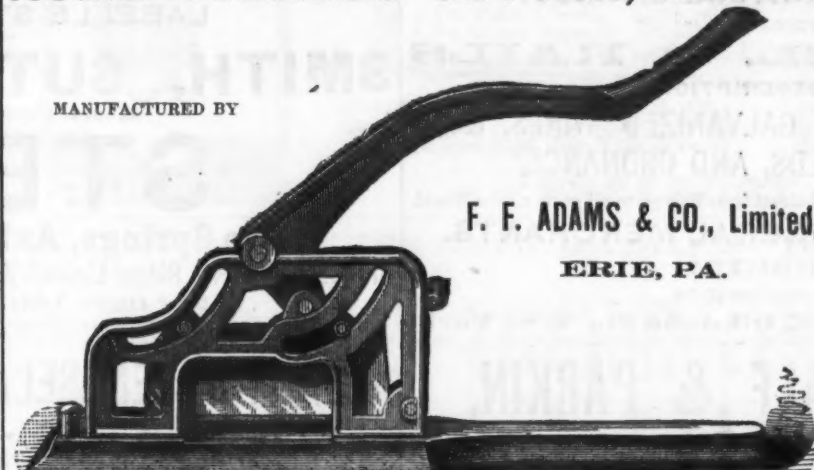
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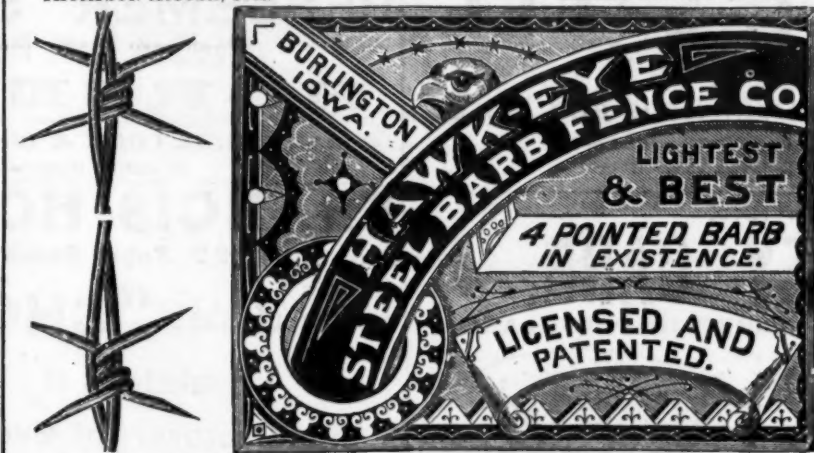
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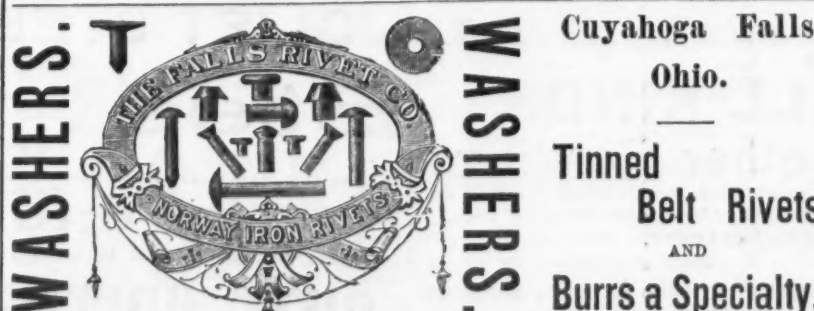
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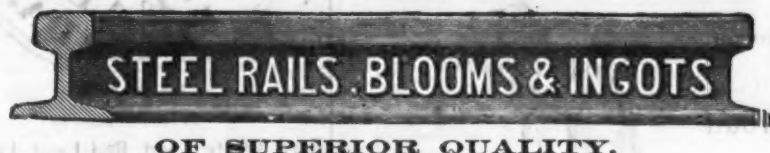
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With which is incorporated The Universal Engineer.

Is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows: DECEMBER 31, 1881; JANUARY 28, FEBRUARY 25, MARCH 25, APRIL 22, MAY 20, JUNE 17, JULY 8, AUGUST 5, SEPTEMBER 2 and 30, and OCTOBER 28, 1882.

This Supplement is published in

### FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach out in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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### THE WHOLE FOREIGN HARDWARE TRADE

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and *Foreign Supplement* is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.



## B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.  
Established 1845.  
Office, foot of Houston Street, East River,  
NEW YORK.

## NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

## FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

For Glass and Steel Works.

## SILICA,

Bricks and Cement,

English Fire Bricks,

RIMINGTON BROS. & CO.,

Newcastle-on-Tyne.

Agent on this side

S. A. RIMINGTON,

40 & 42 Broadway,

NEW YORK.

M. D. Valentine & Bro

Manufacturers of

## FIRE BRICK

And Furnace Blocks

DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

## BORNER & O'BRIEN,

Manufacturers

## FIRE BRICK

Edge Pressed Furnace Blocks,  
CLAY RETORTS, TILES, &c.,

Twenty-third Street,  
PHILADELPHIA.

Abner Race,

Twenty years' practical Experience.

## WATSON FIRE BRICK CO.,

ESTABLISHED 1856

Successors to JOHN R. WATSON, Perth Amboy, New Jersey

Manufacturers of

## FIRE BRICK,

FOR ROLLING MILLS, BLAST FURNACES, FOUN-  
DRIES GAS WORKS, LIME KILNS, TANNERIES,  
BOILER and GRATE SETTING, GLASS WORKS, &c.

Fire Clays, Fire Sand, and Kaolin for Sale.

## HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay  
Retort Works,

Manufacturer of FIRE BRICK, HOLLOW  
BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY.

O. Roe & Debot, 418 to 422 East 23d St., N. Y.

## TROY FIRE BRICK WORKS,

Troy, N. Y.,

JAMES OSTRANDER & SON,

ESTABLISHED 1854,

Manufacturers of

## FIRE BRICK,

Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and

dealers in Woodbridge Fire Clay and Sand, and Staten

Island Kaolin.

Established 1864.

## GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,  
TILE & FURNACE BLOCKS,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and

Miners and Shippers of Fire Clay.

Office: 116 Smithfield St., Pittsburgh, Pa.

WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

## HALL & SONS,

Buffalo, N. Y.

CHAS. D. COLSON,

## FIRE BRICK,

Foundry Facings, Sand, Tools and Supplies.

CHICAGO, ILL.

## UNION MINING COMPANY,

Mount Savage Fire Brick.

EDWARD J. ETING, Agent,

No. 230 South Third St., Philadelphia, Pa.

## THOMAS MORTON,

Manufacturer of

CABLE, COPPER, IRON AND STEEL SASH CHAINS,  
for suspending window shades. Also, Copper Cham-  
pion Chains, with patent attachments, for same pur-  
pose. Agents wanted in the principal cities in the  
United States. Apply at

43 Elizabeth Street, New York.

# HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

## DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER.

Fig. 1.

Patented May 29, 1870.

Fig. 2.



Price, - - - \$37.50 per dozen.

No Farmer, Nurseryman, Railroad  
or Telegraph Company  
SHOULD BE WITHOUT ONE.

NO BACK-ACHE.

NO KNEE-WORK.

NO CLOGGING.

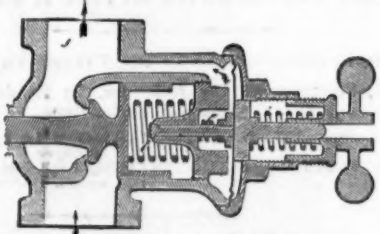
This tool has been thoroughly tested, and has given the greatest satisfaction to all who have tried it. The principle on which it works makes it self-cleaning and prevents adhesion in sticky soil; therefore it always works free and easy. It is far superior to all plungers, augers and boring machines, as it works well in stony, sandy, or clay soils; quicksand under water is as easily removed as though no water existed.



### DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

HENRY DISSTON & SONS.



### Curtis Pressure Regulator.

It is made entirely of metal; occupies the same space as a globe valve. It has no glands or packing, and is a lock-up valve. Write for circular. Manufactured by CURTIS REGULATOR CO., 59 Beverly Street, BOSTON, MASS.

WITHEROW & GORDON,  
Engineers & Contractors,  
PITTSBURGH, PA.

Sole Agents for the

WHITWELL  
HOT BLAST STOVES.

OVER 600 IN USE.

The following parties either have them in use or under construction:  
Cedar Point Iron Co., N. Y.  
Dunbar Furnace Co., Pa.  
Crane Iron Co., Pa.  
Pennsylvania Steel Co., Pa.  
Neshannock Iron Co., Pa.  
R. H. Coleman, Lebanon, Pa.  
Chester Rolling Mill Co., Pa.  
Davenport, Fairbairn & Co., Pa.  
Isabella Furnace Co., Pa.  
Paxton Furnaces, Pa.  
Spearman Iron Co., Pa.  
Etna Iron Works, Ohio.  
Milton Coal and Iron Co., Ohio.  
Winona Furnace Co., Ohio.  
Ross & Marshall, Ohio.  
H. Campbell & Sons, Ohio.  
Hocking Valley Iron Co., Ohio.  
Cleveland Rolling Mill Co., Ohio.  
Meier Iron Co., Ill.  
North Chicago Steel Co., Ill.  
Union Iron and Steel Co., Ill.  
Means & Culbertson, Ky.  
Ashland Furnace Co., Ky.  
Norton Iron Co., Ky.  
Southern States C. I. and S. Co., Tenn.  
Sewanee Furnace Co., Tenn.  
James C. Warner, Rising Fawn, Ga.  
Ohio Iron Co., Zanesville, O.  
Gloss Furnace Co., Ala.

### THE LOWE PATENT FEED WATER HEATER & PURIFIER.



FOR  
Heating and Pur-  
ifying Water for  
Steam Boilers.  
Patented July 12 1877.  
Has Straight  
Tubes.

SIMPLICITY,  
RELIABILITY and  
EFFICIENCY  
At Less Cost  
Than any Other.

Write for prices and  
further information to  
the manufacturers,

Lowe & Watson,  
BRIDGEPORT, CONN.

STEEL STAMPS STENCIL BRANDS  
BRASS RUBBER STAMPING INK &c.  
A. M. MICHAEL, ALBANY, N.Y.



Gentlemen.—This cut illustrates our

CAST IRON

### Furnace Lamps

which are superceding entirely the Tin Lamps  
wherever introduced, in consequence of their dur-  
ability. They are now extensively used in the  
Iron Districts of Ohio and some in Pennsylvania.

We call your attention to and solicit your order  
for them, confidently asserting that they are an

A No. 1 article in every respect.

Sample sent if desired.

PRICE, \$12 PER DOZEN.

Taylor & Boggis,  
CLEVELAND, O.

## MORSE TWIST DRILL AND MACHINE CO.

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,  
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,

BIT STOCK DRILLS,

DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL  
PRESSES, BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER  
AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS,  
DRILL GRINDING MACHINES, TAPER REAMERS, MILLING  
CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt.

EDWARD S. TABER, Treas.

## RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I.

Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, President.

C. H. PERKINS, Gen'l Manager.

R. W. COMSTOCK, Secretary.

For Foundries, Machine Shops, &c.

Manufactured by

VAPOR OIL STOVE CO.,

No. 99 Ontario St., Cleveland, O.

Send for Circular.

This is the only Coal Oil Vapor Torch protected  
by U. S. Patents; all others are infringements.

COAL  
OIL

VAPOR  
TORCH

John T. Lewis & Bros.

No. 281 South Front St.,  
PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,  
Orange Mineral, Linseed Oil,  
AND PAINTERS' COLORS.

Brooklyn White Lead Co.



TRADE MARK

White Lead, Red Lead & Litharge.  
No. 182 Front Street,  
NEW YORK.

JOHN JEWETT & SONS

Manufacturers of the well-known brand of  
WHITE LEAD.

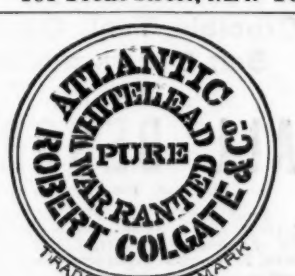


TRADE MARK

ALSO MANUFACTURERS OF

LINSEED OIL.

181 Front Street, NEW YORK.



The Atlantic White Lead and  
Linseed Oil Co.,

Manufacturers of

White Lead (Atlantic), Red Lead, Lith-  
arge, Glass Makers' Litharge and  
Orange Mineral;

LINSEED OIL,

Raw, Refined and Belled.

ROBERT COLGATE & CO.,

287 Pearl St., NEW YORK.

HOWARD IRON WORKS,

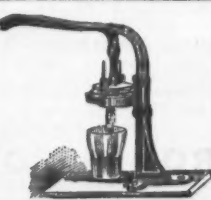
BUFFALO, N. Y.,

Manufacturers of

BOLT CUTTERS

AND NUT TAPPING MACHINES,  
(Schlenker's Patent.)

Send for Illustrated Catalogue.



R. Onderdonk,  
Sole Manufacturer of  
LEVER LEMON  
SQUEEZER,  
With Perforated Strainer,  
405 Grand St.,  
NEW YORK.

Price \$12.00.

Liberal discount to the trade.

Send for Circular.

Manufactured by

CLARK SINTZ,

Springfield, Ohio.



PHILADELPHIA.

Corrected Weekly by Lloyd, Silliman & Walton.  
Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

**Anvils.**  
Peter Wright's, 110  
Over 100, 115  
Eagle (American), 100  
**Apple Parers.**  
Penn Apple Parer, \$4.50  
Rotary Peach Parer, 15.00  
Lots of 10 to 25 dozen special prices.

**Axes.**  
Hunt's Kentucky and Yankee, per doz \$9.00 @ 10.00  
Mann's Red Warrior, 8.00 @ 9.00  
Richard Chisel, 8.50 @ 9.00  
Reveled Axes, add 10c  
Double Bit Axes, 19.00

**Augers and Auger Bits.**—New List January 1.  
Bates' Nut Augers, 10c @ 15c  
Cook's Augers, 10c @ 15c  
Watson's Ship Augers, 10c @ 15c  
Benjamin Pierce Auger Bits, 10c @ 15c  
Griswold Auger Bits, 10c @ 15c  
Jennings', 10c @ 15c  
Bonney's Pat. Hol. Augers, list \$4.50 @ 5.00  
Spartan's Pat. Hol. Augers, list \$4.50 @ 5.00  
Balances, Light and Common, 15c @ 20c

**Bells.**  
Bevin Bros. Mfg. Co. Light Hand Bells, 6c @ 10c  
Swiss Pattern Hand Bells, low list 10c @ 15c  
Connell's Door Bells, 10c @ 15c  
St. Western & Kentucky Cow, new list, 10c @ 15c

**Belt and Rivet Clippers.**  
Chambers' No. 1, for 1/2 inch, each, \$7.50  
No. 2, 1/2 inch, 12.00  
No. 3, 1/2 inch, 15.00

**Boring Machines.**  
Upright, without Augers, list \$5.00 @ 10c  
Anchors, without Augers, 6.75  
Belts—Eastern Carriage Belts, 10c @ 15c  
Stanley, Wrought Shutter, 10c @ 15c

**Braces—Barber's.**—list 10c @ 15c  
Buckus, 10c @ 15c  
Buckford, 10c @ 15c  
American Nail, 10c @ 15c

**Butts.**—Cast Fast Joint, Narrow, 10c @ 15c  
Broad, 10c @ 15c  
Cast Loose Joint, Narrow, 10c @ 15c  
Broad, 10c @ 15c

**Blind Butts.**  
Parker, 10c @ 15c  
Clark's, 10c @ 15c  
Shepard, 10c @ 15c  
Lull & Porter, 10c @ 15c  
Hufner's, 10c @ 15c

**Chains.**—German Halter and Coll. new list Oct. 22, 1870, 10c @ 15c  
Valvanized, 10c @ 15c  
Best Proof Chain, 10c @ 15c

**Chisels.**—Socket Framing, 10c @ 15c  
Socket Firmer, 10c @ 15c  
Butcher's, 10c @ 15c  
Butcher's—Red (new list July 1, 1880), 10c @ 15c

**Coffee Mills.**—Box and Side, new list Jan. 1, 1880, 10c @ 15c  
Enterprise, 10c @ 15c  
Cutlery—Walden Pocket, new list net

**Draining Knives.**  
Hart Mfg. Co.'s, 10c @ 15c  
Adjustable Handle, 10c @ 15c

**Fry Pans.**  
Thinned, 10c @ 15c  
No. 1, 10c @ 15c  
No. 2, 10c @ 15c  
No. 3, 10c @ 15c  
No. 4, 10c @ 15c  
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No. 8, 10c @ 15c  
No. 9, 10c @ 15c  
No. 10, 10c @ 15c

**Files.**  
Nicholson, 10c @ 15c  
Dixton, 10c @ 15c  
Butcher, 10c @ 15c  
Bower, 10c @ 15c  
E. M. Boynton, new list, 10c @ 15c

**Fluting Machines.**  
Eagle—1/2 in. roll, each, \$2.15 @ 3c  
Crown—1/2 in. roll, 3c @ 5c  
Geneva Fluter, 10c @ 15c  
Favorite com. Fluter & Slat Iron, 10c @ 15c

**Hammers.**  
Yorkes & Plumb, new list, 10c @ 15c  
Handles, 10c @ 15c  
Boynton's Pat. Saw Handles, 35c per pair net

**Hatchets.**  
Yorkes & Plumb, new list, 10c @ 15c  
Hunt, 10c @ 15c

**Hinges.**  
Strap and T, 10c @ 15c  
Horse Nails, 10c @ 15c  
Ausable, 10c @ 15c

**Locks and Keys.**  
Brantford, 10c @ 15c  
Gavford Cabinet, 10c @ 15c  
American Padlocks, 10c @ 15c  
Scandinavian Padlocks, 10c @ 15c

**Lanterns.**  
Square Candle and Oil, 10c @ 15c  
Tubular, 10c @ 15c  
Globes, 10c @ 15c  
Lawn Mowers—Pennsylvania, 10c @ 15c  
Philadelphia, 10c @ 15c

**Lawn and Garden Pumps.**—list \$5.00 @ 10c  
Mattresses, 10c @ 15c  
Long and Short Cutter, 10c @ 15c  
Pennsylvania Pattern, 10c @ 15c

**Machinery.**  
Enterprise Mfg. Co.'s Measuring Faucets, 10c @ 15c  
Stebbins' Gates, 10c @ 15c  
Lincoln's, 10c @ 15c  
Landers, Frary & Clark's Petroleum, 10c @ 15c  
Brass Liquor Cocks, new list Jan. 1, 1880, 10c @ 15c

**Meat Cutters.**—Pennsylvania, 10c @ 15c  
Woodruff, 10c @ 15c  
Stowe, 10c @ 15c  
Hale's, 10c @ 15c  
American, 10c @ 15c  
Stuffer, 10c @ 15c  
Enterprise, 10c @ 15c

**Planers.**—Ohio Tool Co., 10c @ 15c  
Soloto, 10c @ 15c  
Auburn, 10c @ 15c  
New York Tool Co., 10c @ 15c  
Haley, 10c @ 15c

**Plane Irons.**—Ohio Tool Co., 10c @ 15c  
Butcher's, 10c @ 15c  
Plumb and Levels, 10c @ 15c  
Stanley's Adjustable, 10c @ 15c

**Picks.**—New list, 10c @ 15c  
Pumps—Bickford, 10c @ 15c  
Riles—Stanley Boxwood, 10c @ 15c  
Stanley Ivory, 10c @ 15c  
Steel Yards—Hart's Pattern, 10c @ 15c

**Shovels and Spades.**  
Griffiths, 10c @ 15c  
Howard, 10c @ 15c  
Sad Irons—10 lb, 10c @ 15c  
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Sad Irons—88 lb, 10c @ 15c  
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Sad Irons—96 lb, 10c @ 15c  
Sad Irons—98 lb, 10c @ 15c  
Sad Irons—100 lb, 10c @ 15c

**Flat Head Iron.**—list 10c @ 15c  
Round Head Iron, 10c @ 15c  
Screws, 10c @ 15c  
German River, 10c @ 15c  
Britannia, Boardman's, 10c @ 15c  
Parker's, 10c @ 15c  
Tinned, 10c @ 15c  
Spring, 10c @ 15c  
Philadelphia, 10c @ 15c  
Chaffield No. 1, 10c @ 15c  
Gum Coal No. 1, 10c @ 15c  
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No. 99, 10c @ 15c  
No. 100, 10c @ 15c

**Stocks and Dies.**  
Steve Poliss, 10c @ 15c  
Dixon, 10c @ 15c  
Onyx, 10c @ 15c  
Tacks, 10c @ 15c  
Double Pointed Tacks, 10c @ 15c

**Traps.**  
Genuine Oneida—Newhouse, 10c @ 15c  
Im. Oneida—Newhouse list, first qual., 10c @ 15c  
Wines—Solid Box Trotter, new list, 10c @ 15c  
Wrenches—Agricultural, 10c @ 15c  
Cores—Genuine, 10c @ 15c  
Reckless, 10c @ 15c  
Mail Bar, 10c @ 15c  
Phila. Tool Co., Duplex, 10c @ 15c

**Wire.**  
Bright or Ann'd, No. 6 to 18, 10c @ 15c  
No. 19 to 26, 10c @ 15c  
Coppered, 6 to 18, 10c @ 15c  
Tinned Broom Wire, 10c @ 15c  
Galvanized No. 7 to 18, Market List, 10c @ 15c  
Wires, Peerless No. 24, 10c @ 15c  
Universal, No. 26, 10c @ 15c  
Novelty, No. 10, 10c @ 15c

**Merchant Iron.**  
Terms.—Note or acceptance at 60 days, with current rate of exchange on New York or a draft on date of invoice, for cash, if remitted within 10 days from date of invoice.

**For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.**

The following are card rates.

**Flat Bar.**  
1 1/2 by 1/2 by 10 ft, 10c @ 15c  
1 1/2 by 1/2 by 12 ft, 10c @ 15c  
1 1/2 by 1/2 by 14 ft, 10c @ 15c  
1 1/2 by 1/2 by 16 ft, 10c @ 15c  
1 1/2 by 1/2 by 18 ft, 10c @ 15c  
1 1/2 by 1/2 by 20 ft, 10c @ 15c  
1 1/2 by 1/2 by 22 ft, 10c @ 15c  
1 1/2 by 1/2 by 24 ft, 10c @ 15c  
1 1/2 by 1/2 by 26 ft, 10c @ 15c  
1 1/2 by 1/2 by 28 ft, 10c @ 15c  
1 1/2 by 1/2 by 30 ft, 10c @ 15c  
1 1/2 by 1/2 by 32 ft, 10c @ 15c  
1 1/2 by 1/2 by 34 ft, 10c @ 15c  
1 1/2 by 1/2 by 36 ft, 10c @ 15c  
1 1/2 by 1/2 by 38 ft, 10c @ 15c  
1 1/2 by 1/2 by 40 ft, 10c @ 15c  
1 1/2 by 1/2 by 42 ft, 10c @ 15c  
1 1/2 by 1/2 by 44 ft, 10c @ 15c  
1 1/2 by 1/2 by 46 ft, 10c @ 15c  
1 1/2 by 1/2 by 48 ft, 10c @ 15c  
1 1/2 by 1/2 by 50 ft, 10c @ 15c  
1 1/2 by 1/2 by 52 ft, 10c @ 15c  
1 1/2 by 1/2 by 54 ft, 10c @ 15c  
1 1/2 by 1/2 by 56 ft, 10c @ 15c  
1 1/2 by 1/2 by 58 ft, 10c @ 15c  
1 1/2 by 1/2 by 60 ft, 10c @ 15c  
1 1/2 by 1/2 by 62 ft, 10c @ 15c  
1 1/2 by 1/2 by 64 ft, 10c @ 15c  
1 1/2 by 1/2 by 66 ft, 10c @ 15c  
1 1/2 by 1/2 by 68 ft, 10c @ 15c  
1 1/2 by 1/2 by 70 ft, 10c @ 15c  
1 1/2 by 1/2 by 72 ft, 10c @ 15c  
1 1/2 by 1/2 by 74 ft, 10c @ 15c  
1 1/2 by 1/2 by 76 ft, 10c @ 15c  
1 1/2 by 1/2 by 78 ft, 10c @ 15c  
1 1/2 by 1/2 by 80 ft, 10c @ 15c  
1 1/2 by 1/2 by 82 ft, 10c @ 15c  
1 1/2 by 1/2 by 84 ft, 10c @ 15c  
1 1/2 by 1/2 by 86 ft, 10c @ 15c  
1 1/2 by 1/2 by 88 ft, 10c @ 15c  
1 1/2 by 1/2 by 90 ft, 10c @ 15c  
1 1/2 by 1/2 by 92 ft, 10c @ 15c  
1 1/2 by 1/2 by 94 ft, 10c @ 15c  
1 1/2 by 1/2 by 96 ft, 10c @ 15c  
1 1/2 by 1/2 by 98 ft, 10c @ 15c  
1 1/2 by 1/2 by 100 ft, 10c @ 15c

**Round and Square.**  
1 1/2 by 1/2 by 10 ft, 10c @ 15c  
1 1/2 by 1/2 by 12 ft, 10c @ 15c  
1 1/2 by 1/2 by 14 ft, 10c @ 15c  
1 1/2 by 1/2 by 16 ft, 10c @ 15c  
1 1/2 by 1/2 by 18 ft, 10c @ 15c  
1 1/2 by 1/2 by 20 ft, 10c @ 15c  
1 1/2 by 1/2 by 22 ft, 10c @ 15c  
1 1/2 by 1/2 by 24 ft, 10c @ 15c  
1 1/2 by 1/2 by 26 ft, 10c @ 15c  
1 1/2 by 1/2 by 28 ft, 10c @ 15c  
1 1/2 by 1/2 by 30 ft, 10c @ 15c  
1 1/2 by 1/2 by 32 ft, 10c @ 15c  
1 1/2 by 1/2 by 34 ft, 10c @ 15c  
1 1/2 by 1/2 by 36 ft, 10c @ 15c  
1 1/2 by 1/2 by 38 ft, 10c @ 15c  
1 1/2 by 1/2 by 40 ft, 10c @ 15c  
1 1/2 by 1/2 by 42 ft, 10c @ 15c  
1 1/2 by 1/2 by 44 ft, 10c @ 15c  
1 1/2 by 1/2 by 46 ft, 10c @ 15c  
1 1/2 by 1/2 by 48 ft, 10c @ 15c  
1 1/2 by 1/2 by 50 ft, 10c @ 15c  
1 1/2 by 1/2 by 52 ft, 10c @ 15c  
1 1/2 by 1/2 by 54 ft, 10c @ 15c  
1 1/2 by 1/2 by 56 ft, 10c @ 15c  
1 1/2 by 1/2 by 58 ft, 10c @ 15c  
1 1/2 by 1/2 by 60 ft, 10c @ 15c  
1 1/2 by 1/2 by 62 ft, 10c @ 15c  
1 1/2 by 1/2 by 64 ft, 10c @ 15c  
1 1/2 by 1/2 by 66 ft, 10c @ 15c  
1 1/2 by 1/2 by 68 ft, 10c @ 15c  
1 1/2 by 1/2 by 70 ft, 10c @ 15c  
1 1/2 by 1/2 by 72 ft, 10c @ 15c  
1 1/2 by 1/2 by 74 ft, 10c @ 15c  
1 1/2 by 1/2 by 76 ft, 10c @ 15c  
1 1/2 by 1/2 by 78 ft, 10c @ 15c  
1 1/2 by 1/2 by 80 ft, 10c @ 15c  
1 1/2 by 1/2 by 82 ft, 10c @ 15c  
1 1/2 by 1/2 by 84 ft, 10c @ 15c  
1 1/2 by 1/2 by 86 ft, 10c @ 15c  
1 1/2 by 1/2 by 88 ft, 10c @ 15c  
1 1/2 by 1/2 by 90 ft, 10c @ 15c  
1 1/2 by 1/2 by 92 ft, 10c @ 15c  
1 1/2 by 1/2 by 94 ft, 10c @ 15c  
1 1/2 by 1/2 by 96 ft, 10c @ 15c  
1 1/2 by 1/2 by 98 ft, 10c @ 15c  
1 1/2 by 1/2 by 100 ft, 10c @ 15c

**Half Oval and Half Round.**  
1 1/2 by 1/2 by 10 ft, 10c @ 15c  
1 1/2 by 1/2 by 12 ft, 10c @ 15c  
1 1/2 by 1/2 by 14 ft, 10c @ 15c  
1 1/2 by 1/2 by 16 ft, 10c @ 15c  
1 1/2 by 1/2 by 18 ft, 10c @ 15c  
1 1/2 by 1/2 by 20 ft, 10c @ 15c  
1 1/2 by 1/2 by 22 ft, 10c @ 15c  
1 1/2 by 1/2 by 24 ft, 10c @ 15c  
1 1/2 by 1/2 by 26 ft, 10c @ 15c  
1 1/2 by 1/2 by 28 ft, 10c @ 15c  
1 1/2 by 1/2 by 30 ft, 10c @ 15c  
1 1/2 by 1/2 by 32 ft, 10c @ 15c  
1 1/2 by 1/2 by 34 ft, 10c @ 15c  
1 1/2 by 1/2 by 36 ft, 10c @ 15c  
1 1/2 by 1/2 by 38 ft, 10c @ 15c  
1 1/2 by 1/2 by 40 ft, 10c @ 15c  
1 1/2 by 1/2 by 42 ft, 10c @ 15c  
1 1/2 by 1/2 by 44 ft, 10c @ 15c  
1 1/2 by 1/2 by 46 ft, 10c @ 15c  
1 1/2 by 1/2 by 48 ft, 10c @ 15c  
1 1/2 by 1/2 by 50 ft, 10c @ 15c  
1 1/2 by 1/2 by 52 ft, 10c @ 15c  
1 1/2 by 1/2 by 54 ft, 10c @ 15c  
1 1/2 by 1/2 by 56 ft, 10c @ 15c  
1 1/2 by 1/2 by 58 ft, 10c @ 15c  
1 1/2 by 1/2 by 60 ft, 10c @ 15c  
1 1/2 by 1/2 by 62 ft, 10c @ 15c  
1 1/2 by 1/2 by 64 ft, 10c @ 15c  
1 1/2 by 1/2 by 66 ft, 10c @ 15c  
1 1/2 by 1/2 by 68 ft, 10c @ 15c  
1 1/2 by 1/2 by 70 ft, 10c @ 15c  
1 1/2 by 1/2 by 72 ft, 10c @ 15c  
1 1/2 by 1/2 by 74 ft, 10c @ 15c  
1 1/2 by 1/2 by 76 ft, 10c @ 15c  
1 1/2 by 1/2 by 78 ft, 10c @ 15c  
1 1/2 by 1/2 by 80 ft, 10c @ 15c  
1 1/2 by 1/2 by 82 ft, 10c @ 15c  
1 1/2 by 1/2 by 84 ft, 10c @ 15c  
1 1/2 by 1/2 by 86 ft, 10c @ 15c  
1 1/2 by 1/2 by 88 ft, 10c @ 15c  
1 1/2 by 1/2 by 90 ft, 10c @ 15c  
1 1/2 by 1/2 by 92 ft, 10c @ 15c  
1 1/2 by 1/2 by 94 ft, 10c @ 15c  
1 1/2 by 1/2 by 96 ft, 10c @ 15c  
1 1/2 by 1/2 by 98 ft, 10c @ 15c  
1 1/2 by 1/2 by 100 ft, 10c @ 15c

**Horse Shoe.**  
1 1/2 by 1/2 by 10 ft, 10c @ 15c  
1 1/2 by 1/2 by 12 ft, 10c @ 15c  
1 1/2 by 1/2 by 14 ft, 10c @ 15c  
1 1/2 by 1/2 by 16 ft, 10c @ 15c  
1 1/2 by 1/2 by 18 ft, 10c @ 15c  
1 1/2 by 1/2 by 20 ft, 10c @ 15c  
1 1/2 by 1/2 by 22 ft, 10c @ 15c  
1 1/2 by 1/2 by 24 ft, 10c @ 15c  
1 1/2 by 1/2 by 26 ft, 10c @ 15c  
1 1/2 by 1/2 by 28 ft, 10c @ 15c  
1 1/2 by 1/2 by 30 ft, 10c @ 15c  
1 1/2 by 1/2 by 32 ft, 10c @ 15c  
1 1/2 by 1/2 by 34 ft, 10c @ 15c  
1 1/2 by 1/2 by 36 ft, 10c @ 15c  
1 1/2 by 1/2 by 38 ft, 10c @ 15c  
1 1/2 by 1/2 by 40 ft, 10c @ 15c  
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1 1/2 by 1/2 by 88 ft, 10c @ 15c  
1 1/2 by 1/2 by 90 ft, 10c @ 15c  
1 1/2 by 1/2 by 92 ft, 10c @ 15c  
1 1/2 by 1/2 by 94 ft, 10c @ 15c  
1 1/2 by 1/2 by 96 ft, 10c @ 15c  
1 1/2 by 1/2 by 98 ft, 10c @ 15c  
1 1/2 by 1/2 by 100 ft, 10c @ 15c

**Wagon Box Iron.**  
1 1/2 by 1/2 by 10 ft, 10c @ 15c  
1 1/2 by 1/2 by 12 ft, 10c @ 15c  
1 1/2 by 1/2 by 14 ft, 10c @ 15c  
1 1/2 by 1/2 by 16 ft, 10c @ 15c  
1 1/2 by 1/2 by 18 ft, 10c @ 15c  
1 1/2 by 1/2 by 20 ft,



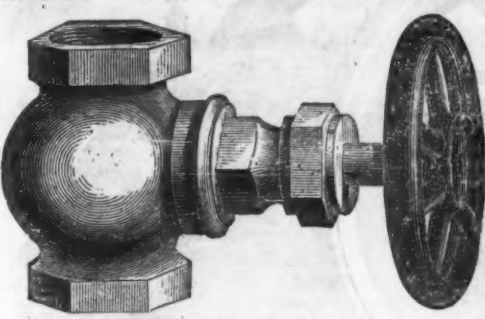
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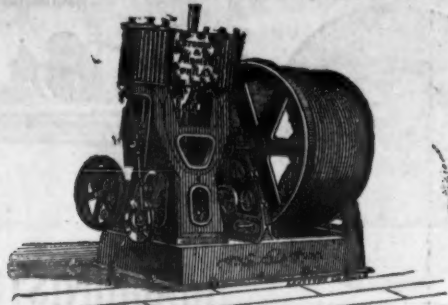


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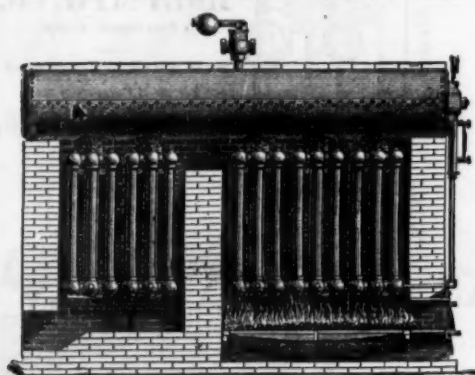
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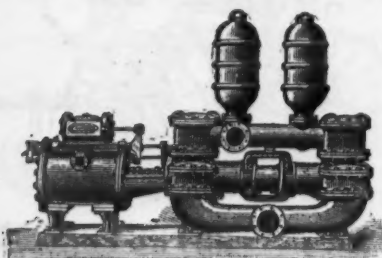
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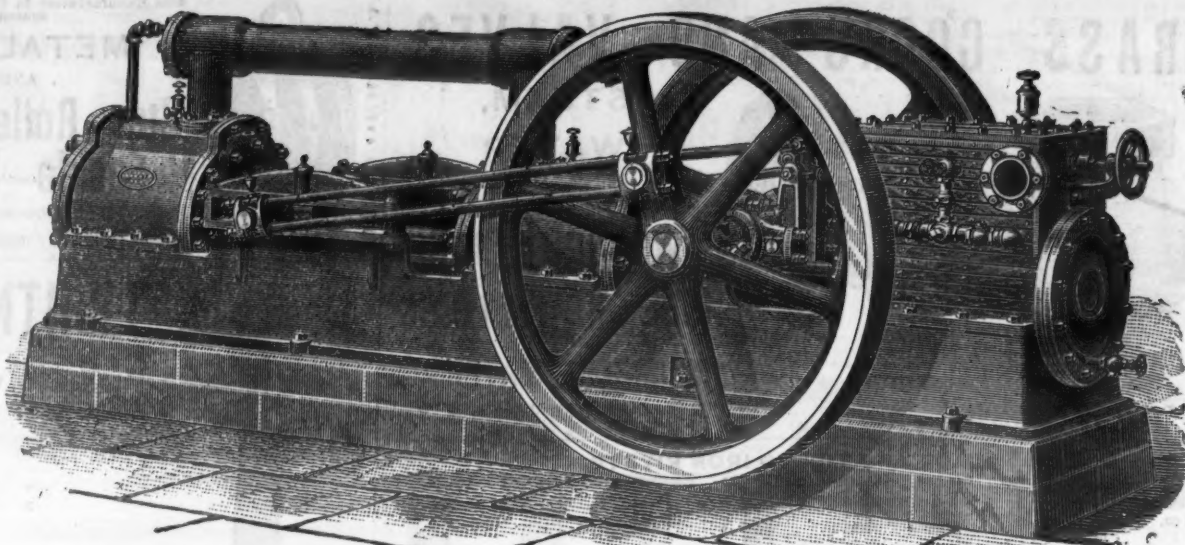
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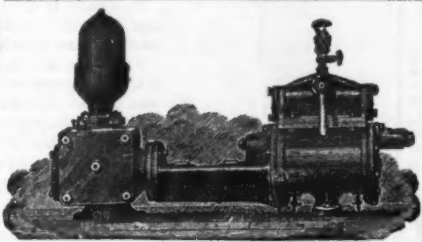
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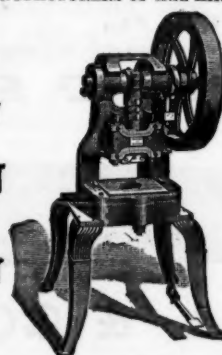
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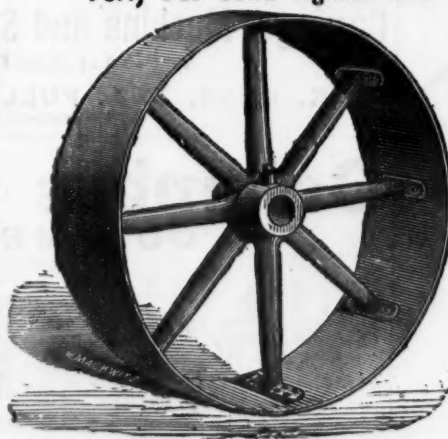
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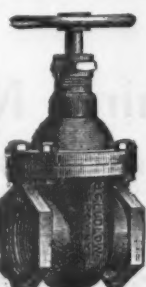
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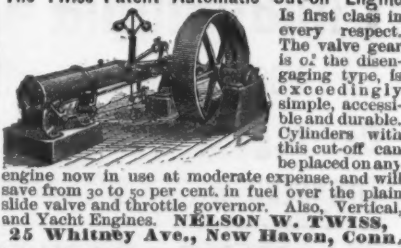
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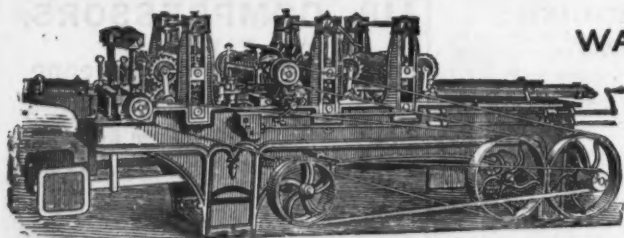
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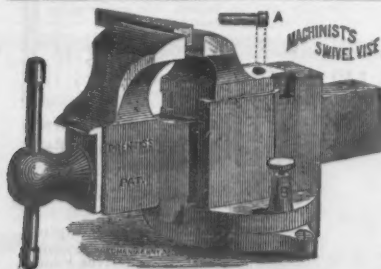
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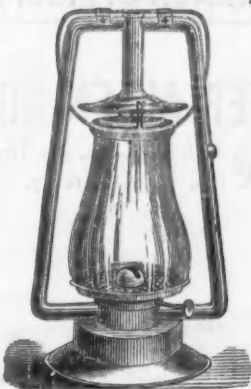
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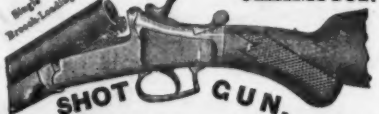
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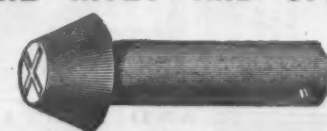
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